

HANDBOOK of MEDICAL TREATMENT

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FOREWORD

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WILLIAM J. CHATTON
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PREFACE TO 6th EDITION

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WILLIAM J. CHATTON
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June 1958

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Chapter 1

GENERAL ASPECTS OF MEDICAL MANAGEMENT

Selection of all the information for choosing the optimum physical and mental treatment for the following general and particular infirmities and patients

1	Activity and disability	Pages 1 and 2
2	Environment	Page 3
3	Clinical view	Page 3
4	Lab tests	Page 6
5	Fluid	Page 5 and 7
6	Symptoms and patient management	Page 27
7	Diet	Page 46
8	Special measures	See Special Diseases

ACTIVITY STATUS

Bedridden long bed dwellers to be abstained from methods of mobilization. It is how to do it that counts.

The degree of the type of patient should be based on the condition of the patient's physiological condition. It is not only the physical condition but also the mental condition. The degree of the symptoms (e.g., fatigue) on the other hand, it is not only the physical condition but also the psychological condition.

Type of Activity Status

- A Ambulatory For all patients who are able to walk.
- B Bedridden with the room For patients who are unable to walk but can move in the room.
- C Bedridden with the room For patients who are unable to walk and are confined to the room.
- D Complete Bedridden For patients who are unable to move at all.

2 Bed Positions

Undesirable Effects of B & R at

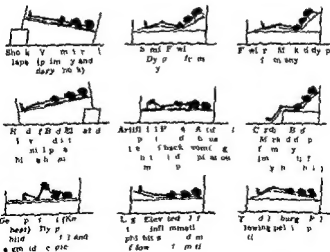
Even in disease states for which bed rest may be employed as a therapeutic measure there are decidedly undesirable consequences which make consideration of early ambulation necessary

- A General. Anemia muscle atrophy bone atrophy decubitus ulcers vasomotor instability and exsufflation constipation insomnia hypochondriacal trends phlebothrombosis
- B Elderly or Dehilitated Patients. Obstructive pneumonia phlebothrombosis with resultant pulmonary infarction urinary retention from atonic bladder or prostatic stricture on foot and toe deformities (with prolonged rest)
- C Cardiac Patients (Especially those with nocturnal dyspnea) Increased dyspnea when recumbent increased venous stasis and phlebothrombosis
- D Psychiatric Patients. In repeated introspection further fixation on physical inadequacies
- E Rheumatoid Arthritis Patients. Deformity ankylosis

Measures to Reduce Hazards of Complete Bed Rest

- A Limitation of nocturnal and daytime naps
- B Deep breathing exercises to prevent orthostatic pneumonia
- C Good nursing care emphasizing frequent changing of position by attendant maintenance of proper elimination and rigorous skin care to prevent decubitus ulcers
- D Improvement of venous circulation by elevation of lower extremities and use of passive exercises
- E Foot cradles half bell splints supporting pillows and other measures to prevent physical deformities (see 524) Always have footboard at base of bed

BED POSITIONS AND INDICATIONS



ENVIRONMENT

A suitable physical environment for a geriatric patient includes a good attention of the many personal equipment and idiosyncrasies of the individual patient. The following environmental features should always be considered:

- | | | |
|--------------------|------------------------|---------------|
| 1 Room temperature | 4 Lighting | 7 Elimination |
| 2 Humidity | 5 Social contact | 8 Food and |
| 3 Ventilation | 6 Elimination of waste | 9 Allergens |

CLINICAL OBSERVATIONS

Considerable information of the patient, as well as diagnostic value, may be gleaned from a carefully maintained clinical record. Such information may provide valuable data about response to treatment, complications and prognosis of the disease and will help in assessing the general comfort of the patient. The following brief clinical data are included for the convenience of the clinician in formulating plans for following the course of the patient. The physician's task is considerably simplified if the patient is in hospital where adequate nursing facilities are available. Skillful nursing supervision and careful nursing notes of patient's activities, vital signs, medication and other important data make possible more effective management of the patient.

Body Temperature

A Method of Determination and Normal Adult Values

Age	Normal Temp	Range of Temp
Retard	99.6 F (37.5 C)	98.5-99.9 F (37-37.7 C)
Young	99.6 F (37.5 C)	98.5-99.9 F (37-37.7 C)
Old	98.8 F (37.0 C)	96.7-99.0 F (36-37.4 C)
Adult	97.6 F (36.5 C)	

B Fever

1 Type

Remittance: Of days or weeks duration with alternating periods of high and low temperature (e.g., brucellosis, tertian malaria). Temperature should be taken tid, qid, or prologed (weeks to months) to determine the fluctuating level and average periods.

B Intermittent: Temperature drops to normal or subnormal level or more in 24 hours (e.g., septicaemia and exanthematous lesions). Temperature must be taken qid to determine the variation within the day.

Continuous: Temperature is very normal during 24 hours period (e.g., pneumonia, influenza). Temperature must be taken qid or at times every 2-3 hours to determine its sustained character.

2 Cause: Infectious disease, certain drugs, foreign poisons, exposure to external heat, coplanthidiasis, diet, banes of heat, gutting, etc. and neoplasms.

4 Clinical Observations

C Subnormal Temperatures May be due to profuse perspiration hemorrhagic shock & decreased B M R and mental depression. A common cause of recorded subnormal temperature is insufficient time allowed for taking temperature. Subnormal temperature may indicate failure in a seriously ill patient and demand immediate supportive intervention. In such cases the physician should be notified at once. Questionable oral temperatures should be checked by rectal temperatures. During afebrile periods it is often advisable to determine the temperatures by the rectal method.

Pulse

- A Characteristics which should be noted and recorded include**
- 1 Rate (normally 60-80 per minute variable) Compare apical and peripheral pulses in patients with arrhythmias.
 - 2 Rhythm Note regularity periodicity and missed beats.
 - 3 Intensity Note fullness of the pulse.
- B Factor in using the pulse rate include cardiac arrhythmias**
i.e. cardiac failure hemorrhagic shock exertion emotional changes oxygen deficit CO_2 excess & increased B M R and certain drugs.
- C Factors affecting the pulse rate include athletic training**
heart block increased intracranial pressure decreased B M R and jaundice.

Respiration

- A Characteristics which should be noted and recorded include**
- 1 Rate (normal range 14-20 per minute)
 - 2 Volume and depth e.g. deep breathing of Kussmaul type
 - 3 Irregularity and periodicity e.g. alternating hyperventilation and apnea of Cheyne-Stokes type
- B Factors in using the rate include error cases**
B M R oxygen deficit CO_2 excess cardiac failure pulmonary disease anemia bronchitis fever COPD and drugs ketosis emotional states pain nifedipine and methamphetamines interfere with breathing.
- C Factors decreasing the rate include hypnosis and narcotic drugs and increased intracranial pressure.**

Blood Pressure

- A Detailed characteristics to be noted and recorded include**
- 1 Position of patient (time of recording)
 - 2 Systolic level by both palpatory and auscultatory methods
 - 3 Strength and character of pulsations of lower extremities in the presence of brachial hypertension
- B Physiological factors which influence blood pressure include**
increased age obesity (if increase is slight to moderate in obese person this is probably due to elevation of plasma pressure due to abdominal distention & intermittent reclining or standing position (compare with blood pressure in recumbency).
- C Pathological factors which influence blood pressure include**
nephritis benign and malignant essential hypertension coronary artery disease intracranial pressure increased B M R adrenal tumors eclampsia and aortic aneurysm.

D Pathological cause of hypotension incl d hemorrhagic shock
d billy a tel vera cardiac failure decompensated B M R
and hypodrenocorticism (Addison's disease)

Interrelationships of Vital Signs

A P I T m p r i r R I t h p

- 1 General feature: degree (F) of temperature rise
the pulse rate usually rises 10 beats per minute i.e.
82 60/min 88 70/min
- 2 Diseases in which pulse rate may be low in proportion to
fever (relative bradycardia) Typhoid fever and latent fever
influenza meningitis infectious mononucleosis
- 3 Diseases in which pulse rate is usually high in proportion to
fever (relative tachycardia) Scarlet fever rheumatic fever
diphtheria thyrotoxicosis subacute bacterial endocarditis
tuberculous terminal or unfavorable pneumonia (pneumonia)

B R p i a t i o n T m p a t e Relationships

- 1 General rule: Respiratory rate usually proportional to temperature change
- 2 Exception: In the acute respiratory diseases (relative tachypnoea hyperpnoea or dyspnoea)

C P I B l d P e s s e Relationships

- 1 General rule: The same factors causing an increase in
cardiac rate usually cause an increase in blood pressure
- 2 Exceptions:
 - a Relative tachycardia Same as for pathological causes
of hypotension
 - b Relative bradycardia Renal disease benign and malignant
hypertension increased intra-cranial pressure

Misleading Observations as to P a t i

The following observations are also important in determining
the general condition following the clinical status of the patient

A Fluid Intake and Output: Consideration of the fluid balance of the patient should include the following:

- 1 Clinical status of state of hydration
- 2 Estimation of need for fluids
- 3 Types of fluid administration
(For details see Chapter 2 p 7)

B Condition of the Skin: Evidence of dehydration (bed or soiled) heat rash hypohidrosis and urticaria

C Condition of the Mouth Lips and Nails: Evidence of dehydration ulcers and dehydration

Local condition: In the mouth perming the patient should
brush their teeth with a toothbrush and use mouth
improvement for eating daily

Patients should be given the opportunity to sit up in the
afternoon meal with plain tap water physiological saline
solution or Alkaline Amino Acid Solution N F (diluted 2:1)

Caution must be taken that the patient is not dehydrated
of fluid and hydration

- D Appetite: Question patient regarding appetite and food intake
Check for food intake by examination of weight gain
Determine reason for rejection of food. Avoid prolonged
fasting or restricted diet for periods less than a full
quarter month (see also on Diet p 46)

6 Laboratory and X ray

- E. Elimination Bed patients are generally prone to constipation. This may be exaggerated by the illness itself, distaste for bland pans diets, and certain drugs. When knowledge of elimination is especially important, gross inspection of all stools passed by the patient may be necessary (see Constipation page 234). Daily inquiry regarding elimination should be made of each patient.
- F. Acceptance or Rejection of Medication Always inquire as to reason for rejection of medication. The patient's objections may constitute a valid reason for modification or cessation of drug therapy. Statements as to untoward reactions from medication always deserve careful evaluation.
- G. Sleep and Rest The patient's statements about amount of sleep or rest may vary considerably from known observations. Provide suitable environment for sleeping and resting by insuring a minimum of interruption by professional services, attendants, visitors, and ward mates. Routine sleep-inducing drugs should be avoided (see Insomnia page 38).
- H. Mental Reaction of Patient Observe patient's mood and behavior carefully. Watch for mental depression which is often associated with costly, confining, serious or chronic illnesses.

LABORATORY AND X RAY STUDIES

Ordering Laboratory and X-ray Studies

The successful and economical ordering and performance of laboratory, x-ray, diagnostic and other special studies constitutes an essential phase of the management of the patient. The blood count, urinalysis, serologic test for syphilis, and perhaps chest x-ray should be performed routinely on all hospital patients.

- A. Special diagnostic studies may call for careful planning and integrating with the therapeutic program and must not conflict with the treatment schedule.
- B. Improperly performed or unnecessary laboratory and x-ray studies, aside from the discomfort, expense, and inconvenience they cause the patient, may prolong hospitalization.
- C. It must be remembered that certain laboratory studies may require dehydration (e.g., Addison test or pyelograms) when it may be clinically dangerous (e.g., precipitation of renal failure).
- D. Likewise, forced fluids (e.g., P.S.P.) may be contraindicated in the presence of nephrosis or severe congestive failure, etc.
- E. X-ray Plain and dye studies should precede all barium contrast studies, and retrograde barium (nema) studies should precede upper gastrointestinal studies, since reversal of this sequence of studies will cause needless delay.

Chapter 2

FLUID AND ELECTROLYTE THERAPY AND PARENTERAL FEEDING

FLUID BALANCE

In considering fluid therapy it is necessary that the problem of water and electrolyte metabolism be considered independently of each other. The electrolyte is intimately concerned with the maintenance of normal cellular metabolism and balance in and with water the maintenance of osmotic pressure in both the extracellular and intracellular fluid compartments. Water in excess of the quantity necessary for maintaining the isotonicity of body fluid is required for normal bodily function. The administration of solution of isotonic electrolytes to the patient cannot be considered as providing available water for the excretion of the same. Electrolyte water must likewise be excreted to keep the solution (urine) almost isotonic.

Daily Obligatory Water Requirements

A considerable amount of water (if electrolyte) is necessary for normal bodily function. These obligatory water requirements are listed to ensure appropriate therapy given in the following table.

AVERAGE DAILY WATER NEEDS FOR EXCRETION

Method of Excretion Loss	Volume of Water Excreted per 100 Calories of Food	Volume of Water Excreted per Day*
Insensible loss (lungs and skin)	44 †	1100 cc †
Sweat (insensible)	35	100
Urine	Varies with excretory rate may be high	800 (more at high excretion rate)
	Varies with amount of waste products to be excreted (electrolyte balance)	Average minimum 1000 cc (if greater than 1000)
Needs for excretion other than urine		1200-1500
Total (including urine)		2200-2500+

Based on 2500 Calorie food intake

†For gross initial estimate the insensible loss of water may be calculated as 10 cc /Kg (or 1/1b) body weight per day

8 Fluid Needs

From the table on the preceding page it is seen that about 1200-1500 cc of water are needed per day in addition to the amount of water necessary for removal of wastes in the urine.

The kidney is the organ which is responsible for regulation of the electrolyte of the extracellular fluid compartment and excretion of the end products of metabolism. In order to preserve the constancy of the extracellular environment the kidney has the ability to concentrate the end products of metabolism. Due to this concentrating ability it is also able to conserve water. This ability to concentrate is limited; the urine can be concentrated to a maximum specific gravity of approximately 1.032. However, the efficiency of the kidney to concentrate falls off rapidly above 1.025 specific gravity. In renal disease states when the ability of the kidney to concentrate is lost, larger amounts of water must be taken or administered in order to remove wastes.

Clinical Evaluation of State of Hydration

- A History Fluid intake and fluid losses. Sudden weight gain and weight losses should be noted since they most frequently indicate changes in water balance.
- B Physical Examination Observe body temperature, skin hydration (turgor), tongue, mucous membranes, heart rate and blood pressure.
- C Laboratory Tests Observe urine volume and concentration, blood counts, hemocrit, serum proteins and N.P.N.
- D Nursing Notes Weigh patient daily. Detailed intake and output record while patient is under observation are extremely valuable. Output should include not only a record of all measurable fluid losses but also notes of observations on less obvious losses such as increased perspiration and respiration. Keeping these records requires considerable effort, so the nursing staff should be notified when this information is no longer needed.

Estimation of Needs for Fluid

Because of the necessity of administering fluids to cover the obligatory non-renal excretory mechanisms, plus sufficient fluids to permit exertion of metabolic waste by the kidneys, an accurate measurement of the 24-hour urine volume and specific gravity will aid greatly in determining whether sufficient fluid is being administered. Approximately 1.5 to 2.0 Gm. of urinary solids are excreted per day per 100 Calories metabolized. This amounts to approximately 35 Gm. of solids per day for the average adult. More concentrated urine generally remove proportionately greater amounts of metabolic wastes, although this relationship does not hold absolutely true in diabetes mellitus and certain other diseases which may alter urine concentration by the presence of abnormal amounts of certain substances. The relationships between specific gravity, volume, and urinary solids per 24 hours are shown in the table on the following page.

* 2.7 grams of glucose or 3.9 grams of albumin will raise the specific gravity of 1000 cc. of urine 0.001 at 15°C.

Sp G Urine	Gm Solids per Liter	Urine Vol /35 Gm Solids (Avg Sp Gr)	Urine Vol /50 Gm Solids (Avg Sp Gr)
1.035 1.030	81.79	400	600
1.030 1.025	79.67	475	685
1.025 1.020	67.88	570	800
1.020 1.015	55.43	715	1000
1.015 1.010	43.31	950	1350
1.010 1.005	31.88	1400	2000

Any sudden and marked change in the present hydration status during the latter portion of the collection period will fail to be reflected in the program of the total 24 hour specimen.

ELECTROLYTE AND ACID-BASE BALANCE

No matter how one considers both intracellular and extracellular electrolytes in connection with life. Although the intracellular and extracellular electrolyte concentrations are approximately the same osmotic pressure in the individual is a different. The electrolytes present in the body are grouped into positive ions (cations) and negative ions (anions). The cations are concerned with all the functions of the electrolyte. The anions apparently exert no direct physiological action but are intimately involved with acid-base equilibrium. The following table gives both intracellular and extracellular electrolyte grouped as cations and anions.

VALUES OF EXTRACELLULAR AND INTRACELLULAR ELECTROLYTES

Ion	Extracellular		Intracellular	
	mEq / liter Avg	mg / 100 c	mEq / liter Avg	mg / 100
Positive (cations)				
Na ⁺	142	135 147	13	30
K ⁺	4	4.5 5.5	140	350
Ca ⁺⁺	5	4.5 5.9	0	0
Mg ⁺⁺	3	1.5 3.0	45	54
Total	155		198	
Negative (anions)				
HCO ₃ ⁻	27	25 30	10	22†
Cl ⁻	103	100 110	1	10
HPO ₄ ⁻	2	1.8 2.3	34	400
SO ₄ ⁻	1		48	96
Org. A	6		0	0
Prot. in	16		65	
Total	155		198	

The above approximate values are for the

†V. I. me %

From the previous page it is apparent that the electrolyte patterns of the intracellular and extracellular components are entirely different. Whereas sodium chloride is the main component of extracellular fluid, potassium phosphate is probably as important as potassium is the main component of intracellular fluid. This is of foremost importance in consideration of therapy (see page 17) especially since only the extracellular components are available for clinical measurements.

Since little is known regarding the functions and modes of regulation of the intracellular electrolyte concentration, discussion of the electrolytes must be concerned primarily with the extracellular electrolytes. By a knowledge of the extracellular electrolyte concentration and the mechanisms causing derangement, some inferences can be drawn regarding the intracellular alterations.

VOLUME AND ELECTROLYTE CONTENT OF GASTROINTESTINAL SECRETIONS AND SWEAT

	Avg. 24 hr Vol., ml.	Electrolytes in mEq./L.			
		Na ⁺	K ⁺	Cl ⁻	HCO ₃ ⁻
Extracellular fluid		145	3	111	98
Gastric juice					
Containing acid	2500	10-110	1-32	8-155	0
Achlorhydria		8-120	1-30	100	20
Bile	500	130-160	2-12	90-120	35
Pancreatic juice	700	110-150	2-8	50-95	70-110
Small bowel secretion	100-8000	80-150	2-8	40-135	30
Ileostomy					
Recent	100-4000	100-150	3-30	90-140	30
Adapted	100-500	50	3	20	15-30
Cecostomy	100-3000	50	8	40	15
Urine (to med)	100	<10	<10	<15	<15
Sweat	500-10,000	0-100	0-5	0-100	0

Minor alterations of ion concentration occur in interstitial fluid in response to physical laws governing the production of an ultrafiltrate of plasma.

FUNCTIONS OF THE ELECTROLYTES

The electrolytes of the extracellular fluid serve the principal functions (1) regulation of osmotic pressure and water balance (2) maintenance of ionic equilibrium and (3) body temperature

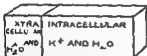
REGULATION OF OSMOTIC PRESSURE AND WATER BALANCE

The osmotic pressure of both the intracellular and extracellular component of the body are at all times equal. In health the osmotic pressure is equivalent to about 310 milliosmole per liter. The total body water is equal to about 40-65% of the body weight with an average of 55% for males and 47% for females. These values are lower in obese individuals and higher in lean individuals. About 15-17% of the body weight is in the extracellular fluid compartment and about 1/3 of this is intravascular. A movement of water between the osmotic composition of the extracellular and intracellular fluid is electrolyte diffusion and this diffusion is maintained by the intracellular enzyme system which removes unwanted electrolyte (eg sodium) rapidly as it diffuses into the cell. Shift of water between the two compartments is the principal means of maintaining osmotic equilibrium whenever there are alterations in electrolyte or water concentration in the body. The significant point is that one cannot clinically differentiate between the two diagrams or overimposed and find it to show the electrolyte shifts that occur in pathological conditions. In short, electrolyte distribution is complex but maintains the the simple equilibrium.

FLUID COMPARTMENTS

Normal

This figure represents total body water with the normal extracellular and intracellular fluid and electrolyte concentrations.

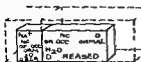


NORMAL

$$\frac{ECF (\text{EXTRACELLULAR FLUID})}{ICF (\text{INTRACELLULAR FLUID})} = K \quad \left(\begin{array}{l} \text{CONSTANT FOR ALL} \\ \text{GIVEN INDIVIDUAL} \end{array} \right)$$

Simple Dehydration without Sodium Loss

In this condition the electrolyte concentrations are concentrated in the extracellular fluid compartment from the intracellular compartment.



SIMPLE DEHYDRATION

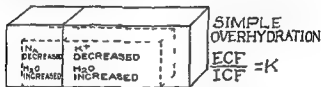
$$\frac{ECF}{ICF} = K$$

12 Functions of Electrolytes

- A Common Clinical Condition Lack of water gastric vomiting
 B Diagnostic Points Marked thirst (probably a symptom of intracellular dehydration) poor tissue turgor high urine specific gravity high hematocrit all extracellular electrolytes may be elevated but proportions normal
 C Treatment Administer fluid without electrolytes Water orally 5-10% glucose in water I.V.

Simple Overhydration

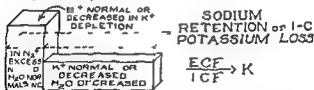
In this condition the electrolytes are diluted the extra cellular intracellular fluid ratio is the same as for normal



- A Common Clinical Condition Excessive fluid intake without salt Excessive electrolyte free fluid administration to patient with oliguria or anuria Excessive posterior pituitary antidiuretic hormone (ADH) production
 B Diagnostic Points Edema low urine specific gravity if patient is drinking a lot when due to posterior pituitary antidiuretic hormone (ADH) elaboration (in which case low urine output with high specific gravity) low Hct all extracellular electrolytes diluted but proportions normal BP normal or elevated Convulsions if extreme
 C Treatment Usually with holding of fluid and electrolyte

Example Sodium Retention or Intracellular K⁺ Loss

This leads to excess fluid in the extracellular compartment with depletion (dehydration) of the intracellular fluid



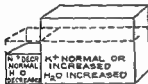
- A Common Clinical Conditions Cardiac failure liver failure with ascites nephrotic syndrome with failure to excrete sodium easily sodium intake administration of metoprolol or ACTH added bilateral gland disease with inadequate K⁺ intake
 B Diagnostic Points
 1 In Na⁺ retention Edema patient may be thin but malnourished elevated BP extracellular sodium concentration may be normal or elevated urine specific gravity usually low
 2 In K⁺ depletion Edema may be present serum Na⁺ may be normal but soft decreased with severe depletion of intracellular K⁺ Low Na⁺ may be due to intracellular K⁺ transfer due to cellular dehydration (also)

C Treatment

- 1 If due to excess Na^+ retention of dietary sodium or administration of agents to increase diuresis by kidney (e.g. diuretic agents such as furosemide (Lasix), hydrochlorothiazide (Durolin) or Witrally 510^{mg} gluconate (Fruitec) to provide electrolyte free water)
- 2 If due to K^+ depletion. Large quantities of K^+ to correct intracellular deficit

Exercise 1: Na^+ Loss (Low Sodium Syndrome)

The clinical condition of extracellular fluid and an increase of intracellular fluid



SODIUM LOSS

$$\frac{\text{ECF}}{\text{ICF}} < K$$

- Common Clinical Conditions Low sodium intake or use of mineralocorticoid diuretics such as furosemide without sodium replacement along with sweating. Addison's disease and sodium binding from the polyuria of diabetes with frequent nocturnal fluid intake.
- Diagnosis Postural hypotension, muscle cramps, low reflexes, and a decrease in serum sodium if gravity is not a factor.
- Treatment Administration of sodium salts in concentrations greater than 0.9% (e.g. 17).

MAINTENANCE OF NORMAL NEUROMUSCULAR FUNCTIONS (Neuromuscular Irritability)

The electrolyte content of the body kept remarkably constant. It is by the kidney's ability to excrete or conserve and to regulate the volume and balance of the various body fluids (total body water) and maintaining a normal osmolarity. In health, wide variations are compatible with life and symptoms arise when excessive or deficient changes occur.

Relationship of Electrolyte and Nervous Function

The relationship between extracellular fluid ion concentration and neuromuscular function is not clear. Many factors and symptoms of deficiency and excess of electrolytes may be due to alterations in intracellular fluid content which may be of the body fluid by the maintenance of extracellular electrolytes and fluid balance.

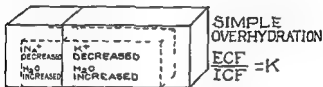
- Vitamins Effect of Hydration. An example of this is found in the effect of two hormones upon serum potassium levels. Aldosterone and thyroxine both increase the excretion of potassium. Both of the hormones can lower the serum potassium level. However, symptoms of potassium deficiency are not developed with the same frequency. It is believed that this is because the hormone aldosterone acts on the renal tubule to increase the excretion of potassium by the body. Deoxycorticosterone has a similar effect.

12 Functions of Electrolytes

- A Common Clinical Condition Lack of water gastric vomiting
- B Diagnostic Points Marked thirst (probably a symptom of intracellular dehydration) poor tissue turgor high urine specific gravity high hematocrit all extracellular electrolytes may be elevated but proportions normal
- C Treatment Administer fluid without electrolytes Water orally 5-10% glucose in water I.V.

Simple Overhydration

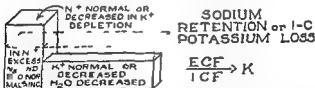
In this condition the electrolytes are diluted the extracellular & intracellular fluid ratio is the same as for normal



- A Common Clinical Conditions Excessive fluid intake without salt Excessive electrolyte free fluid administration to a patient with oliguria or anuria Excessive posterior pituitary antidiuretic hormone (ADH) production
- B Diagnostic Points Edema low urine specific gravity patient is thirsty except when due to primary antidiuretic hormone (ADH) elaboration (in which case low urine output with high specific gravity) low hematocrit all extracellular electrolytes reduced but proportions normal BP normal or elevated Convulsions if extreme
- C Treatment Usually withhold fluid and electrolytes

Example Sodium Retention or Interstitial K^+ Loss

This leads to excess fluid in the extracellular compartment with depletion (dehydration) of the intracellular fluid



- A Common Clinical Conditions Cardiac failure liver failure with ascites endocrine disorders with failure to excrete sodium excesses in sodium intake administration of some steroid hormones or ACTH added bilateral gland excision without adequate K^+ intake
- B Diagnostic Points
1. Na^+ retention Edema patient may be thirsty when it occurs elevated BP extracellular sodium retention may be comparable at duration specific gravity usually low
 2. K^+ depletion Edema may be present serum Na^+ may be normal but is often decreased with severe depletion of intracellular K^+ Low Na^+ may be due to interstitial Na^+ transfer resulting in cellular overhydration (edema)

Respiratory quotient and controlled by high concentration of CO_2 in inspired air leads to decreased ventilation of ST_1 and ST_2 and stimulation of ST_3 and ST_4 in case of T_1 or T_3 or both

Acid of An (Negative)

The gain on concerned almost entirely with osmotic equilibrium and pH changes except for the serum inorganic phosphorus. The phosphorus appears to be added for proper utilization of phosphorylation of glucose and possibly fatty acids and also adequate utilization of many other metabolic additions to the glycolysis while the latter is in the

ACID BASE REGULATION

Acid Base Equilibrium

The pH of the extracellular fluid during life is maintained at 7.35 to 7.45 (average 7.35 to 7.45). A pH beyond this range is incompatible with life. The regulation of the pH within such narrow limits is the function of the buffer system of the body primarily the bicarbonate buffer. At a pH of 7.4 (under normal circumstances) the buffer system consists of 1.35 mEq/L of physiologically dissolved CO_2 , H_2CO_3 and H^+HCO_3^- and 24 mEq/L of $\text{B}(\text{base})\text{HCO}_3^-$ which gives a ratio of 1:20 CO_2 BHCO_3^- . The relationship between the physiologically dissolved CO_2 and the H_2CO_3 is expressed as follows: $\text{CO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3$. The concentration of the dissolved CO_2 is about 1000 times greater than H_2CO_3 . The H_2CO_3 dissociates into H^+ and HCO_3^- to yield the hydrogen ions for the buffer system. Since physiologically dissolved CO_2 is directly related to the partial pressure of the gas in contact with the liquid in the blood, the relationship of CO_2 to the blood and hence the hydrogen ion concentration is directly related to the CO_2 content of the blood (pCO_2). The interrelationships can be expressed as follows:

$$\text{pCO}_2 \approx \frac{\text{CO}_2}{\text{B} + \text{HCO}_3^-} = \frac{1.35 \text{ mEq/L}}{24 \text{ mEq/L}} = \frac{1}{20} = \text{pH } 7.4$$

The ratio of 1/20 keeps the pH at 7.4 regardless of the absolute quantity of H_2CO_3 and BHCO_3^- present. In any problem involving a disturbance of acid-base equilibrium, a more better solution can be obtained if we know (1) the pH, (2) the pCO_2 and (3) the HCO_3^- of the blood. The usual method of obtaining the information is to determine the pH and total CO_2 content of an arterial blood sample and handle the rest of the blood. Knowing these two values, the pCO_2 and HCO_3^- can be calculated using the following equations (Total CO_2 and HCO_3^- in mM/lit, pCO_2 in mm Hg)

(a) To determine pCO_2

$$\text{pH} = 10 + \log \frac{(\text{Total } \text{CO}_2) - 0.0301 \text{ pCO}_2}{0.0301 \text{ pCO}_2}$$

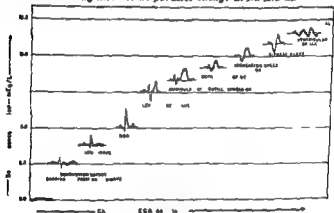
(b) HCO_3^- (Total CO_2) - 0.0301 pCO_2

marked urinary loss of potassium with intra and extracellular depletion and may lead to symptoms of potassium deficiency

- Effect of pH on Electrolytes The pH of the blood is important in determining this intracellular extracellular shift of ions. This is most noticeable in the case of sodium and potassium. In acidosis potassium leaves the cells and tends to be retained by the kidney leading to high extracellular potassium. Sodium may tend to migrate intracellularly during this phase. In alkalosis the reverse occurs potassium moves intracellularly with hydrogen ion while sodium moves extracellularly aggravating the extracellular alkalosis. These changes are shown on p 16

CORRELATION OF THE SERUM POTASSIUM CONCENTRATION AND THE ELECTROCARDIOGRAM

Providing there is no parallel change in Na and Ca



(From K pp Sweet Jawetz and Armstrong Physicists Handbook 10th ed 1958 Lange Medical Publications Los Altos Calif)

Effect of Electrolytes on Electrocardiogram

In addition to the serum concentration of the electrolytes the ECG may be of value in diagnosis of ion abnormalities. Specially alterations occurring during therapy. Because of the complex interrelationship that occurs among the electrolytes reported a few of the most important are those for Ca^{++} and K^{+} .

- Ca^{++} Calcium deficiency prolongs the ST and hence the QT interval. Excess shortens the ST and hence the QT interval. The quantitation of these changes is not well worked out.
- K^{+} The potassium changes are best illustrated by the above diagram. There appears to be an interrelationship between Ca^{++} and K^{+} both clinically in terms of symptoms and ECG effects. The symptoms and ECG effects are antagonistic and a deficiency of one may cancel out a deficiency of the other.
- Mg^{++} and NH_4^{++} No specific ECG changes have been described for nitrogen or sodium ion change. However the effects of sodium appear to antagonize those of potassium.

Administer half the amount in the first 24 hours; the remainder in the next 24 hours. Give a salt by mouth or by the intravenous route.

B. In the case of the replacement of the extracellular fluid, initial replacement can be made especially when pure oral administration is contemplated by estimation of the deficiency in extracellular fluid. This type of calculation obviously in or out of the case of K^+ in this is largely intracellular and deficit may be very large but the amount calculated can be given quite rapidly without dangerous intracellular concentration being produced. Special precautions are necessary in adults with renal insufficiency. Rapid administration may result in hyperkalemia. In the case of HCO_3^- replacement it is also important to take into account the intracellular HCO_3^- . If of calculation thus formula assumes an extracellular fluid content equal to $\frac{1}{3}$ of the body weight. This estimate is not exact, especially in case of disturbed fluid and electrolyte balance.

$$\text{Amount (in mEq)} = \frac{\text{Patient's wt (in Kg)}}{3} \times \left[\text{Normal value of ion (in mEq/L)} - \text{Patient's value (in mEq/L)} \right]$$

Example 100 Kg man has serum CO_2 content of 15 mEq/L. How much sodium lactate is needed to bring serum CO_2 to normal?

$$\text{mEq of } CO_2 = \frac{100}{3} \times (27 - 15) = 20 \times 12 = 240 \text{ mEq}$$

Therefore 240 mEq of sodium lactate is needed by the patient.

Milliequivalent Conversion Factors
for Conversion of Blood Chemistry Findings

To determine mEq/L of	Divide mg % value by
Calcium	2.0
Chloride (from Cl)	3.5
(from NaCl)	5.85
CO_2 Combining Power	44
Magnesium	12
Phosphorus mM (millimoles)	3.1
Potassium	3.9
Sodium	*

IV FLUIDS AVAILABLE FOR ELECTROLYTE

Many hospital intravenous solutions are available and a commercially obtainable list of the solutions available based on isotonicity and influence on the acid-base balance are essential to be added to our knowledge of the electrolyte solutions used. It is important to note and preferably type to which being given intravenously. The following solutions of electrolytes are available for intravenous use:

Administer half the amount in the first 12-24 hours. The remainder in the next 48 hours. Give as 5% by volume of hypertonic solution 1 V.

B) The use of the anion gap of the ion. The L. A. ratio can be made especially when parentheticals are not available. This type of calculation is obvious for correction in the case of K^+ since this ion is large & its concentration may be very large but the concentration of Cl^- is given quite rapidly without causing extracellular concentration being produced. Special cases are necessary in the case of renal insufficiency. Rapid administration may result in hypokalemia. In the case of HCO_3^- replacement it also fails to take into account the intracellular HCO_3^- . The use of this formula assumes an extracellular fluid constant quality of the body weight. This is usually the case usually in a state of disturbed fluid & electrolyte balance.

$$\text{Amount on hand} \quad \frac{\text{Pat. wt. (in Kg)}}{5} \times \left[\text{Normal value of } \frac{\text{mEq/L}}{100} - \text{Patient's level of } \frac{\text{mEq/L}}{100} \right]$$

Example: 100 Kg man has serum CO_2 content of 13 mEq/L. How much sodium lactate is needed to bring a serum CO_2 to normal?

$$\text{mEq of } CO_2 \quad \frac{100}{5} \times (27 - 13) \quad 27 \times 11 \quad 240 \text{ mEq}$$

To receive 240 mEq of sodium lactate is needed by the patient.

Milliequivalent Conversion Factors
for Conversion of Blood Chemistry Findings

Findings mEq/L of	Dividing % or vol % by
Calcium	1.0
Chloride (f on Cl)	3.5
(f on N Cl)	5.61
CO_2 Containing Power	1.34
Magnesium	1.3
Phosphorus (millimol)	2.1
Potassium	3.3
Sodium	2.3

IV FLUIDS AVAILABLE FOR CORRECTING ELECTROLYTE DISTURBANCES

Many fluids in various therapeutic needs have been developed and commercially obtainable. The following is a partial list of the fluids available based on their electrolyte content and infusion rate. The balance of the fluids are available in concentration to be added to other fluid. When these are used, be certain the fluid is isotonic and preferably isotonic. It may even be hypotonic when being given. Isotonic solutions are 0.9% saline (normal saline) of electrolyte containing about 150 mEq. even (normal) and then on the L.

22 Intravenous Fluids

Neutral Solutions Containing Potassium

See page 25 for precautions with potassium administration
Uses For potassium replacement

- A Dilute Potassium Solutions (Given in 5% glucose solution)
 Two different concentrations are given below

Constituent	% Sol	Gm per liter	mEq / liter of	
			K ⁺	Cl
KCl	0.186	1.86	25	25
KCl	0.3	3.0	40	40

- B Concentrates (To be added to half isotonic or more concentrated solutions only) *Never administer directly from ampule*

- 1 Concentrate KCl 20 mEq each of K⁺ and Cl in 10 cc of solution (1.5 Gm KCl/10 cc)
- 2 Concentrate potassium phosphate The addition of potassium phosphate to glucose solutions has been suggested to enhance carbohydrate utilization when indicated (e.g. diabetics do this). This may be best prepared by adding the concentrate to 5% glucose solution the pH of the mixture given is suitable for I.V. use. 20 cc ampules contain 60 mEq K⁺ and 30 mM PO₄ per 10 cc
- 3 Potassium sulfate (Quadrate®) alkalinizing but used only for K⁺ effect. 4 mEq/cc in 30 cc ampules

Neutral Solutions of Mixed Electrolytes

Uses To supply other cations besides Na⁺ and K⁺. Their place in clinical practice is still not clearly defined but since losses of electrolytes are rarely a single combination replacement may be warranted

- A Mixt. Injection U.S.P., Compound Injection of Sodium Chloride B.P. (isotonic)

Constituents	% Sol	Gm per liter	mEq / liter of			
			Na ⁺	K	Ca ⁺⁺	Cl
NaCl	0.88	8.6	145			145
KCl	0.03	0.3		4		4
CaCl ₂	0.033	0.33			6	6
Total			145	4	6	155

- B Concentrate of Potassium Magnesium Chloride (KMC®) (To be added to half isotonic or more concentrated fluids) Contains 25 mEq K⁺ 10 mEq Ca⁺⁺ 10 mEq Mg⁺⁺ 45 mEq Cl / 10 cc ampul or

KCl 1.8 Gm
 MgCl₂ 48 Gm
 CaCl₂ 35 Gm

} in 10

Mixtures of Mixed Electrolyte Yielding Free B

Uses Used where base and potassium replacement is required simultaneously

A Low Potassium Low Fat Beef Lactated Ring Solution
 USP Compound Injection of Sodium Lactate BP
 (Hirshmann's) (1 liter)

Constituent	% Sol	Gm per lit	mEq / liter of ion			
			Na^+	K^+	Cl^-	Cl^-
N Cl	0.6	6.0	102			102
KCl	0.03	0.3		4		4
Ca Cl	0.02	0.2			3.5	3.5
Sodium lactate	0.3	3.0	27			
Total			129	4	3.5	109.5
Free Na^+			27			

B High Potassium High Fat Beef Lactated Potassium Solution
 Injection USP (Dow's Lactated) (VNL) (1 liter)

Constituent	% Sol	Gm per lit	mEq / liter of ion			
			Na^+	K^+	Cl^-	Lactate
N Cl	0.4	4.0	70		70	
N lactate	0.6	6.0	53			53
KCl	0.27	2.7		35	35	
Total			123	35	105	53
Free Na^+			53			

C Veterinary Intramuscular Solution containing K^+ and Cl^- ions
 barbitals available for G.T. Electrolyte Solution
 With 10% Dextrose (Baxter) (1 liter)

Constituent	% Sol	Gm per lit	mEq / liter of ion			
			Na^+	K^+	Cl^-	Lactate*
N Cl	0.51	5.1	85		85	
KCl	0.09	.9		12	12	
Sodium lactate	0.56	5.6	50			50
Dextrose	(10)	(100)				
Total			135	12	100	50
Free Na^+			50			

Sodium Potassium Electrolyte Yield of Fat Acid (Gastric Electrolyte Solution) With 10% Dextrose (Baxter) (1 liter)

Urea Triphosphate Salt Chloride plus frequent small losses of Na^+ and K^+

Constituent	% Sol	Gm per lit	mEq / liter of ion			
			Na^+	K^+	NH_4^+	Cl^-
N Cl	0.37	3.7	63			63
KCl	0.13	1.3		17		17
NH_4Cl	0.37	3.7			70	70
Dextrose	(10)	(100)				
Total			63	17	70	150
Free Cl^-						70

Sodium lactate and potassium lactate
 + Ammonium chloride plus frequent small losses of acid

■ Hypodermoclysis

So called Balanced ■ Electrolyte Solutions

Recently several manufacturers have been distributing so called balanced electrolyte solutions for maintenance therapy. They closely simulate the electrolyte content of plasma except for slightly higher potassium. Their value is questionable however because body losses of electrolytes do not follow the pattern of serum concentration. In the presence of good renal function it is doubtful that the added base or electrolytes are essential. They have no value as corrective agents and may be harmful in some disease states (e.g. metabolic alkalosis).

ROUTES OF ADMINISTRATION FOR ELECTROLYTES

I V Administration

It is most important to exercise great care in administration of I V solutions since these alter extracellular fluid composition rapidly. This is especially true when giving K^+ and Mg^{++} salts which are exceedingly toxic.

In the presence of normal renal and respiratory mechanisms when swallowing is possible the oral administration of salts is preferred.

Oral Administration

When oral salts are administered usually the negative ions are not too important. See page 20 for the commonly used salts.

PARENTERAL FEEDING AND FLUIDS

When oral feeding is impractical the parenteral routes are the methods of choice.

HYPODERMOCLYSIS

Hypodermoclysis is the subcutaneous administration of large quantities of isotonic solutions usually physiological saline or dextrose in water or saline. Administer at rate of 250-500 (1/2-1 pt) per hour by use of 1 needle or 500-1000 (1/2-1 qt) per hour with 2 needles. Usual practical maximum is 3000-4000 cc (3-4 qt) per day. Care must be taken to avoid overdiluting the tissues. This can cause avascularity which may lead to tissue necrosis. When giving glucose solutions 2 1/2% in 1/2 normal saline is preferred. 5% may be given in water but not to debilitated elderly patients. *Never give glucose in concentrations over 5% to any patient.*

To facilitate absorption hyaluronidase may be added. 250 viscosity units are used per 500-1000 cc of fluid. The material may be injected into the tubing of the hypodermoclysis set into the site of insertion of the needle so may be dissolved in the solution. The rate of fluid absorption is increased up to about 12 times.

VENOCLYSIS

The intravenous route of hypotensive therapy is used to replace fluid and nutrients. Fluid electrolyte carbohydrate protein and vitamins can be administered by this method. The following are the main principles:

Water

The minimum water intake should be given I.V. with electrolyte to replace the obligatory fluid loss. The body is composed of 5% to 10% glucose and 1% to 2% in distal water. NEVER administer Rpl in distal water I.V. Potassium hydroxides may be administered in significant quantities of electrolytes (NaCl) and the sodium chloride.

Electrolyte (Minerals)

- A. Sodium** Sodium chloride (NaCl) is the most important electrolyte. Average daily intake is 3 to 5 Gm (45 to 75 gr). Average daily requirement is 300 to 1000 cc (1 pt to 1 qt) physiologically (0.85 to 0.90%) saline. If conditions leading to excessive NaCl loss persist, it may be given. Otherwise, do not give over 1 liter (1 qt) physiologically (0.85 to 0.90 Gm) daily.
- B. Potassium** If peripheral hypotension is continued for over 3 to 5 days, one should polymorph complete electrolyte replacement. Potassium chloride is 3 to 4 Gm of KCl (25 to 50 mEq of potassium). This may be given by oral route or intravenous potassium by adding potassium chloride to all glucose (page 2). Potassium solutions must be administered slowly (25 mEq / liter of K^+ in 2-3 hours). Never administer potassium I.V. in the presence of poor renal function.

Glucose and Other Sugars

May give 5% or 10% solution. Preferably administered in distilled water but may be given in normal saline. Never give more rapidly than 0.5 Gm per Kg (1 dr / 10 lb) per hour. This is maximum rate of infusion. When given more rapidly than the glycosuria and osmotic fluid loss usually result in severe dehydration and fluid restriction is necessary. Some patients with glucose (20-50%) may be given I.V. very slowly.

Equal parts of glucose and fructose (in water) have been found to be better tolerated and absorbed more rapidly than glucose and can be administered more rapidly. They differ, however, not markedly from glucose in their metabolic effects on diabetes mellitus patients.

Potassium

- A. Ammonium** Usually given Potassium Hydroxide (KOH) (vials) NND and usually administered as 3-6% solution (usually in 5% glucose in distilled water). Higher concentrations of potassium may be given with lithium. The lithium salt should be administered slowly (1 liter (1 qt) in 2 hours). If the patient is now low in electrolytes (potassium N^+) but has had no other electrolyte if the patient is

III V asclysis

Amino acids sho ~~be~~ not be g v n whe protein itself would be co traind~~is~~ ated (e g anur~~i~~)

- B C trated Normal Huma Plasma U S I has about 7% protein it is an exc llent sou e of protein Plasma contains sodium chloride in the same concentration as physiological sal~~e~~ so limit usually is 1 liter (1 qt) per day The pr ncipal dis ad antages of plasma are the d nger of producing homologous serum jaundice (even if treated by ltraviolet irradiation) the high cost of the material and pos sible citrate intoxication with large doses

- C Normal Human Serum Albumin U S P or Salt poor Serum Albumin An excellent sour e of protein 25 Gm albumin per 100 cc sol tion is quivalent in osmotic pressure to 500 cc of plasma This is an ex llent way to administ r protein in a small fluid volume and with low salt intake by giving the salt poor material Albumin is very expensive

Fat

Fat emulsions for intravenous se have been the object of in vestigation and e perimentatio for some time Such a p eparation wo ld seem to constitute an xcell nt m ans of maintai ng nutrition if a a lable although its nutritional value as compared w th or l ingestion is not entirely cle r Th main problem app ars to b that no preparation has yet bee offered wh ch is consist ntly free of reactions usually e ere pyrogenic ones The mulsions tend to break down espec ially w th fr zi g or extrem temperatu e cha ges

Vitamins

In prolonged per ter l nutrition o e of the more mplete B m epar tions plus vitamin C and pare teral K hould be admin s tered I V r l M

Gener l Ind qua y of Intravenous Alim ntation

As oon s pra tic l o al feding hould be started It s usu lly impossible to administ red quat s lo s by int avenous means The following he t outlin the gener l pr ctical daily physiological limit of intrav ous alim nt tion Th principal limiting factor is the fl id intake Th admin strat on of 3000 cc of 5% protein hydrolysate in 5% gluco sol tion would giv th follow ing amou ts f flu d ele trol~~ite~~ and nutri nt m t r al

Fluid	Min ral (as NaCl)	Glucos e	Frot in Hyd olys te	Calories
3000 cc	Up to 6.0 Gm	150 Gm	150 Gm	1200

Each 50 Gm of prot in hydr l~~ys~~ te m y ont in up to 4 Gm of NaCl, although most products now contain les N⁺

Chapter 3

GENERAL SYMPTOMATIC TREATMENT

TREATMENT OF CONSTITUTIONAL SYMPTOMS

PYREXIA (Fever) (code No 003)

Measurements specifically directed toward depression of an elevated body temperature per se are usually unnecessary except for high degree prolonged fevers.

A Removal of the Specific Cause of the Fever

- 1 Infection. Sulfonamide drugs (e.g., Monamid) are capable of inducing bacteriologic cures.
- 2 Drug or chemical. Many drugs (e.g., Monamid) are capable of inducing bacteriologic cures.
- 3 Dehydration. Provide adequate oral or parenteral fluid.
- 4 Impairment of CNS ability of regulating center. This poses difficult therapeutic problems. Provide for optimal oxygenation and hydration. If necessary, provide ventilation and hyperventilation by artificial means. If indicated (see below).

B Reduction of the Fever by Nonspecific Means. When the body temperature is greater than 40°C (104°F), patients usually if prolonged the following measures may be utilized:

- 1 Increase fluid intake. By oral or parenteral route.
- 2 Warm alcohol sponges. Cooling is due to evaporation.
- 3 Warm oil pack baths. These cause peripheral vasodilatation.
- 4 Cold sponges. If used promptly cooling of kinetic and psychologic relief is attained with haste.
- 5 Ice bags. Provide local comfort and help to hasten.
- 6 Antipyretic drugs. These drugs exert effective results if given and administered simultaneously analgesic effect. They have the disadvantage that they obscure the clinical picture and may cause undesirable effects such as chills, dyspnea, skin eruptions, hematologic changes and vomiting.
- cardiovascular depression. Such drugs the following are to be employed cautiously in infectious cases and preferably in the treatment of fever (e.g., typhoid fever).
- Aspirin, Acetylsalicylic acid (paracetamol), sodium salicylate or phenacetin (phenacetin) 0.3 to 0.6 Gm (5 to 10 g) every 4 hours.
- It is important among the most commonly used and probably least potent procedure toward reduction.

SHOCK (Circulatory Failure or Collapse) (code No 0x8)

Shock is a complex and as yet incompletely understood clinical syndrome of peripheral circulatory failure. Numerous pathophysiologic mechanisms are involved in the production of shock such as lack of effective blood volume, alteration of diastolic pressure of peripheral vascular tone, increased peripheral pressure, failure

of blood oxygenation mechanisms and alteration of the physiological characteristics of the blood. Two principal types of shock must be differentiated clinically.

A Primary Shock (Immediate Shock Fainting or Collapse)

This form of shock consists of transitory insufficiency of circulation and follows relatively suddenly after certain etiologic factors notably those of neurogenic or psychogenic origin. Although shock responds quite promptly to simple supportive measures it is important to remember that primary shock may proceed in idiosyncrasy into the more serious secondary shock. Careful observation of the patient and correction of the aggravating factors are essential. Some of the more common causes of primary shock are:

- 1 Neurogenic and psychogenic factors. Painful stimuli: trauma, fright, unpleasant sights and odors.
- 2 Asthenia. Due to anemia, acute infections, chronic illness or to prolonged exertion. This is noted most frequently when patients assume an erect posture.
- 3 Certain drugs, e.g., nitrates and local anesthetics.

B Secondary Shock (Delayed Prolonged or Toxic Shock). The onset of this form of shock may be gradual and often is insidious. The classical signs of cold, pale or cyanotic skin, sweating, tachycardia (over 100) and a arterial hypotension, although valuable, may appear suddenly and very often represent fully developed shock. Unfortunately advanced shock is often refractory to even the most vigorous anti-shock therapy. Early recognition of shock is imperative. The possibility that shock may occur must always be anticipated. In addition to the above mentioned cause of shock (primary), secondary shock may result from loss of blood (internal or external), loss of plasma into the serous body cavity (peritonitis) or into traumatized (crushed or bruised) tissues, renal uremia, renal cortical insufficiency, dehydration or acute overwhelming infection (e.g., septicemia).

Treatment of Shock

A EMERGENCY MEASURES - act rapidly. The rapidity of shock will vary with the pathophysiology. The cause which has occurred and which are responsible for the state of the patient. Restoration and maintenance of an effective blood volume is the primary emergency measure in combating shock. Dehydration diminishes blood volume; hypotension, massive infection, hypoproteinemia, acidosis, vascular relaxation and other physiological abnormalities may require prompt treatment.

- 1 Body position. Place patient in the shock position (see page 3) unless he has a head injury.
- 2 Maintain adequate airway.
- 3 Body warmth. Keep the patient comfortably warm. Avoid chilling or excessive externally applied heat. This will further dilate the peripheral vessels.
- 4 Pain. Control pain (particularly if severe) promptly by the use of appropriate first aid measures and analgesic drugs. Give morphine sulfate 10-30 mg ($\frac{1}{2}$ - $\frac{1}{2}$ gr) subcutaneous for pain. Remember that subcutaneous absorption is poor in patients in shock. In case of severe pain morphine sulfate 10-15 mg ($\frac{1}{2}$ - $\frac{1}{2}$ gr) I.V. may be used to great advantage.

val i ge Do not give morphine to unconscious patients patients who have head injuries or those with respiratory depression

Avoid overdosage with morphine but titate barbiturates and salicylates for sedation and analgesia whenever possible

5 Allay apprehension by reassurance if wound and chest pain
barbital sodium 0.1 Gm (1½ gr) orally or 0.13 Gm

(2 gr) subcutaneous by rectal proctostomy if of value
6 Parental fluid therapy Replace and maintain adequate blood volume Nephrotoxicity may be obtained by the history

vital signs and hematocrit values The clinical deterioration of the blood volume is difficult however and is

subject to considerable variation There is no single technique reliable by which to judge the fluid requirement

Response to therapy is a valuable index

a 5% glucose solution Giv immunologically 500 cc

physiological saline 0.5-10% dextrose solution

200 cc of 5% physiological saline solution (may be given orally I.V. while maintaining plasma osmolarity)

Albumin (whole blood) Plasma (human albumin and whole blood) tannin stain in rectum in blood

volume through the colloidal motility of the fluid dextrose electrolyte solution

b Plasma (human albumin) Any of the various plasma preparations as checked for plasma osmolarity

Albumin may be employed depending upon the availability Plasma infusion and type of plasma may be

rapidly set up administration of dextrose not equal plasma electrolyte typing The quantity of plasma to be

given depends upon the stage of hemorrhage and response to therapy but depends on the clinical and laboratory data

(1) Impending hemorrhage Administer 500 cc plasma immediately and follow closely clinically and with hematocrit

trend to determine need for further plasma

(2) Early or advanced shock Administer 500 cc plasma immediately and repeat with 500 cc every half hour

up to total of two liters depending upon clinical course and hemodynamic findings If hemorrhage is

following a chest injury the prognosis is very poor Whole blood If plasma is unavailable human plasma

products whole blood may be administered as needed

d Plasma products Evidence during the last few years supports the view that the effectiveness of plasma

is due to the electrolyte content of blood There is no high molecular weight high osmotic pressure

and the electrolyte concentration is high The high volume of fluid is not causing infarction in patients

(1) Dextrose NND (Ependex® Gt® Plvix®) a water soluble biosynthetic polysaccharide 6% in

isotonic solution I.V. 500-1000 cc at a rate of 20-40 cc/min USE CAUTIOUSLY in patients with

cardiac or renal insufficiency Anaphylactic reaction have been reported in older to a cold hemolytic shock has been reported that white hemoglobinuria

(2) **Plazmoid®** a special purified and nonantigenic 5% gelatine solution in isotonic saline 1 V 500 1000 cc to maintain systolic blood pressure at about 85 mm Hg

- 7 **Vasopressor drugs** These agents are most effective in hypotensive shock without associated decrease in blood volume (e.g. spinal anesthesia syncope and overwhalming intoxications) although they have been stated to be of some value in severe shock due to any cause. They should not be used in lieu of more physiological measures or specific treatment of the cause of shock. In many instances serious question may be raised as to whether the blood pressure elevation produced by the vasopressor drugs has a beneficial or detrimental effect upon the underlying physico-pathological disturbance. (For example the actual influence of the altered peripheral resistance on the blood supply to vital organs is incompletely understood.) Dosage levels for the various agents are empirical and must be carefully adjusted according to patient response (blood pressure and pulse).

- Levarterenol Bitartrate U.S.P. (Levophed®)** 4-16 mg (1/16-1/4 gr or 4-16 cc of 0.2% solution) in 1 L. of glucose 1 V. Avoid extravasation (may cause tissue necrosis and gangrene). With concentrations greater than 4 mg/liter constant supervision and the use of an infusing catheter are required.
- 1-henylephrine Hydrochloride U.S.P. (Neo-Synephrine®)** 0.5 mg (1/120 gr) 1 V or 3 mg (1/12 gr) 1 M or by slow 1 V infusions of 100-150 mg/liter of glucose.
- Nephertamine N.N.D. (Wyamine®)** 3-20 mg (1/12-1/3 gr) at a rate of 1 mg (1/60 gr) per minute by continuous 1 V infusion or 15-20 mg (1/4-1/3 gr) 1 M.
- Metamizol Bitartrate N.N.M. (Aramine®)** 2-10 mg (1/30-1/6 gr) 1 M or 15-100 mg (1/4-1 1/2 gr) in 250-500 cc of 5% dextrose or 0.5-3 mg (1/120-1/12 gr) 1 V.
- Methamphetamine Hydrochloride U.S.P. (Vasodril®)** 15 mg (1/4 gr) 1 M or 5 mg (1/12 gr) 1 V or 35-40 mg (1/2-1 1/3 gr) in 250-500 cc of 5% dextrose by slow 1 V infusion.

B. Specific (Definitive) Measures

- Anoxia (or hypoxia)** Anoxia is probably present (a primary or complicating factor in all types of shock) therefore oxygen may be considered for most patients in shock. In some patients oxygen may be indicated for other reasons (cardiac failure pneumonia, etc.). However the patient in impending shock is probably alive with marked intermittent times serves to increase his apprehension.
- Dehydration** Administer 500-1000 cc of physiologic salt or 5% dextrose solution 1 V or by hypodermoclysis as needed. As soon as patient can swallow give fluids by mouth. Unless the clinical picture indicates evidence of sodium deficiency avoid administration of more than one liter of physiologic fluid on the first day. Subsequent parenteral fluids may be given as dextrose solutions (see pages 7-10).
- Adrenal cortical failure** Adrenocortical steroid therapy has been found to be effective in shock due to associated

with ergo m d lemerg clea Although t m t m f is
mo t p ctf c lly applied to sho k of Add n ri is it
may also be of p cta uar v lu m c t in ut lla gie
me ge f and o e whelmig i to i tion H e Hydro
ortisone (f ee alcohol inf ion con i t fo I V use)
100 150 mg d luted in 1000 c 5% glucos or e lin by slow
I V drip Hyd o o tiso e Sod m S ccia te N N D
(Sol Co ter[®]) 100 mg m y b giv n in 2 cc ter l w t
p isoto i aslin I V over a o minute pe lod it lly
w th sub eq e t dos of 50 mg as q ired

- 4 Ca diac f l re Dig t is dother t atm t f d:
f il are i dicat d o ly fo thos pat ts w th p e e et g
r pr e ntng vid ce of c rd failure (ee p g 18)

D g talis i of n val e in shock d e to y oth r ca

- 5 I fe ti n Immed ate me s e should be tak n to comb t
f ct on lf p se t Ov whelmng inf ct o e ap ble
f p duct g e ff cient met b l hanges th body ti s e
to p d spo to ho k P ophyact a t b lics are of
doubt f l val e d m y e be h m f l e cept wh th
h d of inf ct l e g eat (g sten i e rna)

- 6 Hemo hage and m a Alth gh plasma is a lly giv
a an me g ncymess e l hock compl at gh mo hag
acut n m m t b o r ted by replacem t w th whole
blo d to prev t hyp xia Th q tity of whole blood to b
giv n will dep d pon hematoc it t di

C Ev l tio f Em rg y Th py Constant observation
of patient is imperative The pulse esp also temper
tu (rectal) and bl od p es e should e evaluated imm di
at ly d ve y 15 30 mi tes o oft e the e fter until the
is def te imp ov ment of th p iph al c c lat o

- 1 Rapid r ove y If vital s gn ret rn rapidly to n mal
k epp tment and ci ob ryati n b t w th l d f th
anti hock the py Check vital s gn ev ry half h r Pe
f rm h m t rit i d if the is any uspic n whatever
that a onda y h ck exat R m mbe that hem on n
trati n ually p de blood p e r nd pulse changes
Aft e limi at g pot tial o ex ti g shock p od i g f c
t e the p tle t m y b m ged xp t nly t l it is
es n bly c stan that d ger h p e s d

- 2 Prolong d recove y If the v t l l gns em in ab orm l fo
ven bri f p lod fte int l me s o sh w ev denc
of f r the p og ion of p ph l lrcul tory fail e in
stt i f u ther vigor a a H hock the py Blo d hem
globin RBC a d hematocrit ho id e d t m d imm d
tely for base line nd ho e b e p t d e oft n e
ss ry t ev l te th re R f th rapy

PAIN (General Aspects) (code No 518)

Con ept of pain and p n m hanisms e highly o t o e tal
and so that eon all l saific ti s of pain m i quite a bit ra y
e p ti al purp es th r a two p ip llyp of pain pe
fici l and d p P ai t ha ply l caliz d in p ficial stru t
and diff sely o poo ly lo l d in d ep rat ct r e D p p i
may ee it in r f r d p P i m y c as a ult of

■ Pain

multiple types of stimuli acting upon the various body structures. The relief of pain may be achieved by removal of the stimulus or neutralization of the effects of the stimulus and when these are not feasible by dulling or obliterating the sensation of pain.

Analgesic Drugs

A Salicylates The most commonly used of the various analgesics and frequently employed for self-medication.

1 Actions and indication Antipyretic analgesic antirheumatic and uricosuric useful relieving myalgias neuralgias auralgias headaches and dysmenorrhea.

2 Preparations dosage and administration

a Acetylsalicylic Acid U.S.P. B.P. (aspirin or ASA) plain or enteric coated 0.3 Gm (5 gr) tablets. Ordinary dosage is 3.0 to 6 Gm (5 to 10 gr) every 4 hours per os. 0.3 Gm (5 gr) every 2 to 3 hours is stated to be more effective and lasts in fewer hours than the 1 gr doses at less frequent intervals. The plain preparation may cause gastric distress; this may be avoided by administration of the drug on a full stomach or with $\frac{1}{2}$ to 1 tsp of baking soda or other antacid. The enteric preparation is slower acting but it prevents gastric irritation and is also useful for those patients who might be skeptical of the analgesic value of ordinary aspirin. In certain cases it may be necessary to administer the powdered aspirin rectally in a thin starch paste.

b Sodium Salicylate U.S.P. B.P. plain or enteric coated 0.3 to 0.6 Gm (5 to 10 gr) every 4 hours per os.

c Acetylsalicylic acid compound (a purin compound or ASA-C) a synergistic combination.

R Acetylsalicylic acid 0.32 gr iss
Phenacetin 0.16 gr iss
Caffeine 0.032 g ss

Sig 1 to 2 tablets every 3 to 4 hours per os.

d Aspirin and codeine preparation ratio as (see below).

e Analgesic sedative mixtures

R Sodium salicylate 10 to 15 gr ss
Elixir of phenobarbital q.s. ad 120 gr ss

Sig 1 to 2 tsp every 4 hours per os.

R Phenobarbital sodium 0.032 gr ss
Acetylsalicylic acid 0.32 gr ss

Sig 1 capsule every 4 hours per os.

f Methyl Salicylate (Oil of Wintergreen) U.S.P. For external use. See also monograph on sore muscles. Joint. A 10% preparation in oil or ointment.

3 Untoward reactions Usually mild consisting of drowsiness and sore stomach but in large doses myocar-ditis, depression, blurring of vision, use of vomit, gastric distress, diaphoresis, headache, delirium. In the patient acetylsalicylate may cause renal damage and electrolyte imbalance.

B Acetophenetidin U.S.P. Phenacetin H.P. 0.3 Gm (5 gr) every 3 to 4 hours may be employed in certain cases of salicylate intolerance. In general, however, this drug is more toxic than other analgesic preparations and probably is not advised. Its principal use is in analgesic combination (e.g., APC).

■ Colchicine U.S.P. (see Gout page 321)

Narcotic Drugs

Drug which relieves pain and at the same time produces euphoria sleep or stupor. Pain relief occurs prior to loss of consciousness and catdiffer relief of pain of degree greater than that controllable by analgesics or when pain is of type not susceptible to analgesic drug (e.g. visceral pain). All of the following drugs require narcotic prescriptions. These drugs should always be discontinued as soon as the need for them is past.

A Codaine Phosphate U S P B P *16-60 mg*

- 1 Analgesic and sedative. Pharmacologically similar to morphine but of less intensity. CNS depression in ordinary dosage but CNS stimulation in high doses. Produces indolence, constipation, and decreases bowel motility (constipating). Preferred over morphine for relief of moderate degrees of pain because it is much less habit forming, is non-choleric and results in fewer untoward reactions.

2 Preparation, dosage and modes of administration

a Codaine Phosphate U S P B P 0.005 to 0.065 Gm

(1/40 to 1/16 gr) orally or subcut every 3-4 hours p.r.n.

Ordinary 1/60 Gm (1 gr) is the time for analgesic use. At strong narcotic dose, larger doses of codeine are indicated by untoward side reactions.

b Codine hydrochloride (codeine and aspirin)

Codine phosphate 0.005 to 0.065 gr 1/40 to 1/16

Aspirin 0.3 to 0.6 gr v.s.

S.g. 1 tablet every 3-4 hours p.r.n.

Codine and aspirin ethyl alcohol compound

Codine phosphate 0.016 to 0.065 gr 1/40 to 1/16

Aspirin 0.3 to 0.6 gr diss.

Phenacetin 0.160 gr li.s.

Caffeine 0.032 gr s.

S.g. 1 tablet every 3-4 hours p.r.n.

3 Untoward reactions. Allergic reactions such as urticaria

pruritus contact dermatitis and anaphylactoid

reactions may occur. Addiction is much less apt to follow use of this drug than use of morphine.

B Meprobamate Hydrochloride U S P Pethidine Hydrochloride 100 mg

B P (Demerol[®] Dolanum[®]) 0.050 to 0.100 Gm (3/4 to 1/2 gr)

orally or I.M. (not subcut) very 3-4 hours p.r.n. (added to

the pain reliever for pain associated with smooth muscle

spasm (e.g. pyloric spasm) although this is disputed. It may

be given to individuals who do not tolerate morphine and is less

potent than morphine to cause nausea, vomiting and respiratory

depression. Analgesic effect is less than with morphine.

Dilaudid[®] and methadone. Addition tends to be finally to

C Methadone Hydrochloride U S P (Amidone[®] Dolophan[®]) 5

0.005 to 0.010 Gm (1/12 to 1/6 gr) subcut or I.M. every 3-4 hours

p.r.n. provides analgesia of a level similar to morphine but

is slower acting and has a too suppressive effect on the

analgesic tolerance and develops slowly than with morphine.

Untoward reactions to the drug are similar to those due to morphine

and the addiction is not cyclical as with the am. The drug

is not tolerated well orally.

D Morphine Sulfate U S P B P This drug remains the most

valuable for pain relief in the general hospital.

- 1 A tions and sedation C t al n vous yst m dep asi
r ulting in p w ful analgesi asso iated with s dati
e pho ia and hypno is lectiv respi tory nte depr s
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intracra i l p sure H s ma k d useating and mel
effects in cert in pat ts h ma ked con tip ting eff ts
uses ap sm f bill y and u ter l mouth m s le i u e
ful in providing r lief from acute or pr l g d eve Pain
e p ally pain arising from conditi s whi ha of le s than
10 14 day dur ti n The drug may b valuable in the t at
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s d ac a thma f left v ntr ular fail re) Ri s c m
monly u ed and valu ble p oper tive drug
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hypothyroid m morphin sm head i jury Add on dis
se and cir umata wh n vom t g m y be dang ou
- 3 Prep ations do g s and mod of administ tion
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gr) lly o sub ut In as s of s v r agoni ing
pain sp lly p in as s i t d w th imp nding neu o
g nic sho k (g a te pan r attis) the drug may b
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b Belladonna lkaloid s h e tropin and sc p larin
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Wh n administ ed im litan o sly with mo phin m y
red c s me of the u i ward effect of morphine
- 4 Untoward actions Hypn i (m y b und irabl) pi
tory dep s on n v a and v miting, s v e stip t n
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tion) Add tion t nd ncy s gr t
- E D hydrom phin Hyd o hio d , U S P (Dil ed d²) 0 00 3
Gm (1/24 g) lly r 0 001 0 004 Gm (1/60 1/15 gr)
but v y 3 4 h s pr n st t d to h v s f w r un
toward eacti ns (us s vcm ting o stip tion) than m rphine

Loc 1 A th t is

- A Cocain Hyd ochl id U S P B P 10 207 s i tion fo
top l o and sh t ppl ations
- B D b ai Hyd ochl id , N N D Cln ho ain Hyd o hio ide
B P (N p aine²) lutions of 1 2 000 t 1 1 000 inje t d
locally fo n f n ati an thesia (Not over 100)
- C Ethyl Aminob n o t U S P B o i B P 1 20% oint
m t applied loc lly
- D Ethyl Chl ride U S P B P sp sy d locally until formation
of t an ent wh t f oet oc urs
- ✓ E Pr m Hyd ochl id U S P B P 0 5 1 0 1 37 o i tion
f infiltr tion an th

Ge er 1 A sth ti

Eth admin st red by d op inhalation m thod or admini ter d
ctally in g tabl oil 22 30 90 c (1 3 oz)

A t lds and A ti p modics Se pages 264 nd 266

V moto D g Se pages 34 nd 211

1. Actions and Indications Central nervous system depression resulting in powerful analgesia associated with sedation, euphoria, and hypnosis; a slight respiratory center depression and dulling or abolition of the cough reflex. In cases of intracranial pressure has marked nauseating and emetic effects in certain patients has marked constipating effects. A suspension of biliary and uterine smooth muscle is useful in providing relief from acute or prolonged severe pain especially pain arising from conditions which are of less than 14 days duration. The drug may be valuable in the treatment of severe cardiac dyspnea (e.g. pulmonary edema, cardiac asthma of left ventricular failure). It is commonly used and valuable pre-operative drug.
2. Contraindications Morphine sensitivity, bronchial asthma, surgical abdomen, idiopathic (diagnosed) hepatic diseases, hypothyroidism, morphine, head injury. Addison's disease and circulatory arrest when vomiting may be dangerous.
3. Preparations dosage and mode of administration.
 - a. Morphine Sulfate U.S.P. B.P. 0.005 to 0.015 Gm ($\frac{1}{4}$ to $\frac{1}{8}$ gr) orally, rectally, or by injection. In cases of ever increasing pain especially pain associated with impending neurogenic shock (e.g. acute pancreatitis) the drug may be given slowly in 5 cc physiological saline I.V.
 - b. Belladonna alkaloids such as atropine and copolamine in dosages of 0.0003 to 0.0006 Gm ($\frac{1}{200}$ to $\frac{1}{100}$ gr) subcutaneous. When administered simultaneously with morphine may reduce some of the untoward effects of morphine.
4. Untoward reactions Hypnosis (may be undesirable), respiratory depression, nausea and vomiting, miosis, constipation, all glaucomas (uveitis, papilledema) and anaphylactoid reactions. Addictive tendency is great.
5. Dihydrocodeine Hydcodeine, U.S.P. (Dilaudid®) 0.0025 Gm ($\frac{1}{24}$ gr) orally 0.001 to 0.004 Gm ($\frac{1}{80}$ to $\frac{1}{16}$ gr) subcutaneous every 3-4 hours per 1 at 10 to 15 mg untoward reactions (nausea, vomiting, constipation) than morphine.

Local Anesthetics

- A. Cocaine Hydrochloride, U.S.P. B.P. 10-20% solution for topical nose and throat applications.
- B. Dibucaine Hydrochloride, N.N.D. Ciba. Cocaine Hydrochloride B.P. (N.p. at 4%) solution of 12.000 to 11.000 mg injected locally for infiltration anesthesia. (Not over 100 cc.)
- C. Ethyl Aminobenzoate U.S.P. Benzocaine B.P. 1-20% ointment or applied locally.
- D. Ethyl Chloride U.S.P. B.P. sprayed locally until formation of a white frost.
- ✓ E. Potassium Hydrochloride U.S.P. B.P. 0.5-1.0-1.5% solution for infiltration anesthesia.

General Anesthetics

Ether administered by drop inhalation method or administered rectally in vegetable oil B.B. 30-90 cc (1-3 oz.)

Atacide and Antispasmodic See pages 264 and 265

Vasomotor Drugs See page 34 and 211

Autonomic Nervous System Drugs

Disorders of the autonomic nervous system are encountered in a wide variety of diseases both as primary and secondary manifestations. The number and variety of drugs which are used in the treatment of these disorders has recently increased. The pharmacologic relationship of these drugs is shown in the chart on page 34.

PSYCHOTHERAPYMedical Examination

Although psychiatric diagnoses must be made on psychiatric findings and must not be based solely on exclusion of organic findings, a careful medical examination (history, physical examination and laboratory studies) is of the first significance in approaching a patient with suspected psychogenic disorders. A thorough clinical history can have considerable assurance value when psychosomatic relationships are discussed with patients. It is really important to point out not only that organic and psychiatric ailments can co-exist but that they are almost invariably interrelated.

- A Avoid either or concept of disease (i.e. either organic or functional) both are usually present.
- B Do not order repeated or prolonged studies merely to impress patient (e.g. extensive investigation of organic trivial).
- C Do not convey unconfirmed suspicion of specific organic disease to patient.
- D Do not hospitalize unless necessary especially if this means exposure to chronically ill patients.
- E Do not neglect medical studies on the preliminary supposition that patient is complainer or faking.

Psychiatric Examination

A careful psychiatric examination usually has both diagnostic and therapeutic value. Expand the usual case history to include inquiry into the patient's emotional difficulties. The thoroughness of this questioning will usually depend upon the case but certain basic information is essential. Question slowly and patiently. The examination should include history and observation of the following:

- A Mediterranean Personality Family history of psychiatric and constitutional inadequacies.
- B Environmental Factors During Development Family childhood training and experiences Family relationships as important friendships social relations hobbies and interests sex experience and attitudes toward all significant experience person and one's religious attitude.
- C Pre-occupations Factors Consider particularly the difficulties the doctor should see potential problems of the patient as anxiety or other preoccupations in way of living death in family members and fatigue.
- D Mental Status Of all in diagnosis the most important psychosomatic complaints. But the somatic complaints are frequently combined in both nervous and psychosomatic.
 - 1 General behavior Appearance speech and mood (the doctor's Emotion/mood). Anxiety agitation relation to doctor.
 - 2 Thought content Illusions delusions or hallucinations.
 - 3 Sensorium Insight intelligence orientation memory.

al Tr m nt

A T me i f Psy hosomati Sympt ms B fo e dis ov ing
 and moving the s of t ns on t may be dvis ble to giv
 relief by tre ting symptom All p stion or concrete
 medical reasures have psychotherapeutic value ■ pid
 repons to s d ti a d a ti pa mod drug m y be t liz d to
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B P l n g of Hyg e c L i n g R g i m P o v i d for optimal physi
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 2 P l n a w o r k b l e i v i g h e d u l e w t h a l l w a n s f o r p r o p e
 e r c i s r e r e a t o r a t a d e l p

T m t of S i t i n l N e o s i (Acute emotio s l d o d r d e
 to u d e i r b l x t a l t e s s)

A Permit the p t n t to t e l l h t r o b l e s (m n t a l t h s s)
 L e d g q s t o s s a c o i d b i t m e b u t i s g e a l l y
 b t t o a l l o w t h p i e n t t o t e l l h i s o w s t y
 B H l p the p t i t o r c t o l l t s i t u a t a l f c t o s
 1 U t i l e i g l s o l a i o w e l f a a g i s s a d a t d
 C t t f a m i l y o a c i t e s t o o b t d d t i o n i f o m t o n
 d f f t d d c h g e v r o m e t
 2 D t d a d a s s a n t o w r d a m p l i f t i o o f p
 o l p b l m s C h g e i v o m e t m t a l t i t u s
 o c u p t i o n l t a t t m y a t t m b e m p s a b l e d
 m y c o m p l i a t h t h e m p l i f y p r o b l e m s H l p t n t
 f d h o b t i t a l l w h i m t o m k h i s o w n d s o
 C D t m i n i h p t i s a n f o h s i n t h i s t u t
 I f t h p t e t i s m m e d f g h p b l m o b j e c t l y
 l t e d p h i l s p h y o c h g i a t t i t u d t o w d t h e s a m p o b
 l m m y m a k e h l f e s t i o n m e t o l b l e
 D U t i l e s b l m a t i n g (d e t i n g) t e c h i E n g p t i e n t t o
 ■ l o p o t h r i t e t s p o t h b b s e m d k i l s p a t u
 l r l y w h e p a t i e t h e x c s o f t i m f o l f p e p t o
 ■ U s k i d l y t t i t d e R e u c e g g t p s u o d
 e e n d m o t o m y b f a l a s t h a s d e m a d s A v d
 p o h n g m g g w t h p a t i t

T m t of D e p t d N o s (Chro emotio l d o d s
 d u t o t l c o n f l t l l y d a t g b k t o h l d h o o d)

A R d c a t o n t e t t t e h n l s h l d b e l e g t e d t o
 t a n d p y h a t i s t M s h n t a v a b l i m p l y m p t o
 m a t i c a n d s p p t v m d i a l m a s u e d s v t h e g r t t
 c o n i d e r t i o n

■ Insomnia

■ AVOID

- 1 Avoid brutally confronting patient with causal factors of neurotic symptoms
- 2 Avoid premature interpretation of psychiatric data
- 3 Avoid anger toward patient because of failure to improve
- 4 Avoid prolongation of psychiatric study and treatment when it is evident that case progresses in unsatisfactory or dangerous. In such cases it is better to refer the patient to individuals more versed in psychiatric methods
 - a Psychoanalytic principles and techniques may be indicated
 - b In inexperienced hands psychiatric meddling may be fraught with dangers. Neuroses are defensive barriers of symptomatic life and if these are broken down an emotional crisis may be precipitated or the patient may have undue resentment toward the examiner
- 5 Avoid aggressive psychotherapy during acute or symptomatic phase of patient's disease

Evaluation of the Depressed Patient as a Suicidal Risk

This patient must always be regarded as potential suicide but certain attitudes and responses assist the doctor in determining this possibility

- A Response to Direct Questioning Regarding Suicidal Intent A patient who is afraid he may commit suicide is not likely apt to do so. A patient who feels that he deserves to die or that life holds no hope is apt to commit suicide. These patients may think of suicide but carefully conceal their intentions
- B Doctor-patient Relationship If a patient remains depressed in spite of the doctor's help the patient is a poor suicide risk. If a patient is reassured by the doctor after a reasonable visit he is less apt to be suicidal
- C Reaction to Patient's Normal Environment A patient who has withdrawn from routine living is a poor suicidal risk. The patient who goes on with effort to continue normal daily contacts and work is probably not so apt to be suicidal
- D An increase in neurotic symptom usually indicate the patient is not likely to commit suicide. These are defensive mechanisms

INSOMNIA (Sleeplessness) (cod No 916)

Insomnia is either a failure to fall asleep or frequent awakening from sleep or inability to remain asleep for normal periods. Individual sleep requirements however vary greatly. The causes of insomnia are multiple. Emotional or mental preoccupation is the commonest cause of persistent insomnia.

- A Psychotherapy Direct measure towards correction of deviation of existing anxieties (see page 37). Medical, relaxation techniques and physical therapy methods could be included under the heading of palliative psychotherapy

B Dietal Measures

- 1 Promotion of optimal general health
 - a Easily digestible foods in reasonable quantities
 - b Treatment of existing systemic disease
 - c Adequate rest, recreation, vacations

- 2 R t f of annoying symptom which interfere w th sleep
a Pain (ll types) d Py o i g N l obstruct on
■ P itus D h h Dyspnea and orthopnea
c Na a f Cough i Urinary d stu banc
- 3 Quiet pre b dtine activity R t tion of x iting act vit e
specially in th pre bedtim pe iod is an indivd al matt =
It i prob bly ad i able for susc pt bl individuals to a end
exciting or thought p voking reading gam s d am or
movi s for a p iod of 1 2 o mo e hours before bedtm
Encour ge light read g and othe non exciting activit s
- 4 Re tri t on of stimulati g b v ag s and drugs sp c ally
aft 3 00 p m e g te offe tob c o ephedrin Lk
d g and amph tamine compounds
- 5 Provision of ill quate al epiag f c l ti e omfortabl
■ d and a quiet and da k room with s t bl nt lat tern
■ tu and hum dity
- 6 Wa m bath b fore b dtum may h ve a elaxing eff ct
- 7 Warm milk tak n at bedtim m yal o h ve a relaxing flect

C Sed i e s d Hyp ot Agent Th outline s of hyp otic
drug to o t o i m n a i n t o ly mp op b t m y also be
dang rous ■ us of hab tuati n d i r m d ge off ling
f m bed te The follow g g ts may b u d

- 1 Win (weet h y o stim la) 60 c (2 o) or lly h
- 2 Wh k y 30 cc (1 o) d l t d w th wat o ally h s
- 3 Ph nob rbit l U S P Ph ob bito B P o lly h
slow (30 60 minutes) ct o and a p lo g d eff ct (8 B
ho s) and pati t pt to h e a bango e It e
et d by kud y and so o t ind ted r l insuff
cien y

Ph ba b tal U S ■ Ph nob rbiton B P 0 015
0 03 Gm (1/4 1/2 g) b d q d as a s d i v d g
th dayt m m y d an acty o te s n officlly to
obvat th n ty fo hypn i do off b b t ales
t ght D ow d d i e s m y b ov r om by
ca f l ad j stme t of th d g o dng to d dual
quir m nte S ll d f i l e of th b b iur t e a
t qui and pharm olog d eff ct d i ty
s e freq lly d to improp d sag ad j tm s Th
hyp tic dos f ph obarbit l 0 1 0 2 Gm (1 1/2 3 gr)
o lly h p r

- b Ph nob b it l Elixir U S P 16 3 cc (4 8 d) n
tain 16 mg p r 4 c orally h p n
Ph nobarbit l Sod um U S P Phen ba biton Sodium
■ P 0 065 0 1 Gm (1 1 1/2 gr) 16" s luti
sub ut ■ n

- 4 ■ Ph nob bital Sod um U S P P tob rbitto e Sod um
B P orally ■ m r pid effect (15 30 minut s) and
horter d ation of acti (4 6 hou s) than phenob rbit l
It is ex ted by th liv and i th fo ont audi ated
in h ■ ti las effci y
- a Pentobarb t l Sodium U S P P at b biton Sodium
B P 0 1 0 2 Gm (1 1/2 3 gr) o lly h s p n
- b P tob b it l Sodium Elixir (N C A) 16 32 (4 8 d)
ont in 20 mg ■ 4 c o lly h s p n
- c P t barbit l Sod um r t l pposit y (N C A) 0 13
Gm 1 2 in rt d ect lly h s p n

d Pentobarbital Sodium Sterile U S P 0.5 Gm administered as a freshly prepared 5% solution I M or I V (slowly and not more than 1 cc per minute)

Toxic reactions to barbiturates include excitement and delirium (especially in children and in elderly debilitated or febrile patients) drug addiction barbiturate dermatitis and circulatory and respiratory depression (see p 538)

5 Chloral Hydrate U S P B P (12.5% Sol) 2.4 cc (0.45 to 0.50 Gm) orally h s p r n

6 Sodium Bromide Elixir N F (17.5% Sol) 1.2 dr h s p r n

7 Paraldehyde U S P B P A useful agent since the clean stock solution is stable and can be used for oral or rectal I M or I V administration as needed. The drug has an unpleasant odor. It may be used in delirium.

a Oral 4 to 6 cc (1 to 2 dr) in cracked ice with milk fruit juice or whiskey

b Rectal 15 to 32 cc (4 to 8 dr) in 30 to 60 cc (1 to 2 oz) of a vegetable oil (1 to 2% dilution)

c I M 5 to 10 cc (1 to 2 dr) (Preferably deep in buttocks)

d I V 1 to 2 cc (15 to 30 mg) in triple volume sterile saline very slowly CAUTION May cause respiratory arrest or pulmonary edema

8 Antihistamine The sedative drug is being used widely for its sedative effect (see p 45)

9 Tranquilizing drugs See below and pp 42-43

TRANQUILIZING DRUGS (See table on pp 42 and 43)

The tranquilizing or ataractic drugs have been accorded a wide acceptance. New preparations recently introduced have a rapid rate of action. They are being used in the symptomatic treatment of many psychomotor disorders. The sedative effect of barbiturates has been replaced by a similar drug having fewer side effects. There is no doubt that these agents have made an important contribution particularly in the field of psychiatry. If the popularity which has surrounded the introduction of these new agents has done nothing else, it has increased professional and public optimism toward the role of psychiatry. The close relationship of psychiatry with organized medicine. However, a cautious and conservative approach toward the introduction of these drugs is indicated. The widely enthusiastic report of early results has been somewhat qualified by the results of some recent studies and the important problem of toxicity and long-term effectiveness is a serious one.

The tranquilizing agents have been used with caution. Operatively because of their tendency to aggravate the hypotension which may be encountered in the administration of a large dose of anesthetic.

None of these drugs can take the place of conventional psychiatric techniques aimed at determining and removing the cause of the illness.

Ph th C mp d

Pharmacologically the compounds most closely fulfill the
 requirements of tranquilizing drugs in that they serve to reduce psych-
 ic without respiratory depressant or hypnotic effect. Un-
 fortunately they are not devoid of toxicity. Principle effects to
 date have been observed with Chlorpromazine USP (Thorazine®).
 The first of these is probably the most common although it would seem likely
 that the most easily marked related compounds would be
 employed with the same caution. (See table on pages 42-43.)

R w lf Prepa ti s

Rawlf's alkaloide is generally recommended for a wide
 variety of conditions in which the depressant effects are now being
 employed on a more limited basis for the treatment of
 all types of depression. The more common psychoses. To
 this day the pleiotropic effects are fortunately not uncommon.
 (See table on page 42-43.)

M p ob m t N N D (Miltow® Eq 1)

The drug made it difficult to determine the quality of
 evidence although the main use is a useful drug for the treatment of
 irritability. The evidence has demonstrated that
 sedative and hypnotic effects. Even do not produce
 also a direct latencies. The compound and the To
 the direct effects may be recommended the appropriate doses
 of the drug. (See table on pages 4-43.)

Oth N b b t t T q n

The erythema of the skin is a definite limitation
 when combined with any other treatment. (See
 table on pages 42-43.)

ALLERGIC DISORDERS

Allergic disorders may be manifested by all degrees of
 intensity by local or systemic any organ system of the body.
 The effect may be acute or chronic and may be
 induced by numerous types of offending agents (antigens). Many
 of these are all derived from the products of the human body
 and although possible all groups. Several different
 varieties of all types of hypersensitivity are described.

N m l Alle gi (C ke)

Dermatological test although not at all with the antigen
 in order to appraise the extent of the allergic percent
 of normal individuals without visible dermatological
 tests. The diagnosis may be readily obtained by appropriate
 skin testing. The appropriate (CAUTION.)

Mph (T 1 st)	0.5 Gm. t.i.d. q.i.d.	Limit d i n i l ad f t i d	M (t d)	R i k per la
MISCELLANEOUS COMPOUNDS				
Ph gly d i N N D	300 mg t.i.d. q.i.d.	A al ty end t i t t	■ lat d	D w l (i f dose)
Xih n y m i N N D	500 mg h	1 n o l	N lat d	■ t i d
Ph gly d i N N D	150-300 mg t.i.d. q.i.d.	A i ty d t i t m i d	■ t i d	N lat d
Ph gly d i N N D	0.25 Gm. t.i.d. p	h n e		

CENTRAL NERVOUS SYSTEM STIMULANTS

SYMPATHOMIMETIC DRUGS

Ep h ph l n Q p (Ep h l n Q p)	35-55 mg t.i.d. q.i.d.	h n p y m i l hypot	C d n d h y	i m n l	h d h p l p t i o w l u n g
Ph gly d i N N D	35-55 mg t.i.d. q.i.d.	d g p o l i g u p l d t d	h a l l R g i t t l	h d h p l p t i o w l u n g	h d h p l p t i o w l u n g
Amph l n n D i d	10 mg b.i.d.	M i d i d p i l b i n y	O i l l y g l t	C e b i l l a l d t m	C e b i l l a l d t m
Amph l n n D i d	10 mg b.i.d.	h n p y m i l hypot	h a l l R g i t t l	h d h p l p t i o w l u n g	h d h p l p t i o w l u n g
Amph l n n D i d	10 mg b.i.d.	h n p y m i l hypot	h a l l R g i t t l	h d h p l p t i o w l u n g	h d h p l p t i o w l u n g
Amph l n n D i d	10 mg b.i.d.	h n p y m i l hypot	h a l l R g i t t l	h d h p l p t i o w l u n g	h d h p l p t i o w l u n g

MISCELLANEOUS COMPOUNDS

M n y n h l d i H C l U S P	10 mg b.i.d. t.i.d.	M i d i d p i l f l g	O r c d l y g l t	i m n l d x t i b i l l y (?)
Ph gly d i N N D	10 mg b.i.d. t.i.d.	h n p y m i l hypot	h a l l R g i t t l	h d h p l p t i o w l u n g
Ph gly d i N N D	10 mg b.i.d. t.i.d.	h n p y m i l hypot	h a l l R g i t t l	h d h p l p t i o w l u n g
Ph gly d i N N D	10 mg b.i.d. t.i.d.	h n p y m i l hypot	h a l l R g i t t l	h d h p l p t i o w l u n g

†D t h l d l d i d t h m d i l l i t t d p o n f h g i t t t e g t d t h t h l i a f m i l i h o m l f w t h d d i a l d a t

44 Allergic Disorders

- A Serum sickness
- B Drug anaphylaxis (see below)
- C Dermatitis venenata (see p 87)
- D Tuberculous sensitization (see p 129)

Atopic Disorders (Coca)

These natural or spontaneous allergic occur about 10% of the population often with a hereditary background. Antigenic etiology is much more obscure than the cause of the normal allergies. Determination of the allergens is much more difficult since complete reliance cannot be placed upon clinical history, skin tests or elimination diets. Clinical or therapeutic trials are often misleading. Eosinophilia is characteristic but certainly not pathognomonic of atopic disorders.

- A Hay fever (allergic rhinitis) ■ Angioneurotic edema (see p 78) (see p 112) ■ Allergic purpura (see p 244)
- B ■ zema (see p 70) ■ Allergic grain (see p 344)
- C Urticaria (see p 78) ■ Allergic asthma (see p 115)

Anaphylactic Reaction (Anaphylactic Shock)

Anaphylactic reactions are the immediate shock like and frequently fatal reactions which occur within minutes after parenteral administration of foreign sera or drug. Although there is also occasionally no history of previous exposure to the foreign substance, acute reactions undoubtedly represent increased hypersensitivity. Anaphylactic reactions to sera, penicillin and other antibiotics and practically all other repeatedly administered parenteral therapeutic agents may occur. It is for this reason that potentially life-saving drugs should not be administered indiscriminately by oral, topical or parenteral routes. Likewise it is probably best to have emergency drugs available in the event of anaphylaxis. Penicillinase injectable (Neutrapen®) 800,000 units I.V. followed immediately by 800,000 units I.M. has been reported to be of possible value in penicillin anaphylaxis. Experience with this drug is limited.

Symptoms include apprehension, pale, cyanotic, generalized urticaria or edema, hives, sensation of suffocation, wheezing cough, continued shock, severe dilatation of pupils, loss of consciousness and convulsions. Death may occur within 5-10 minutes.

A. Emergency Treatment (URGENT)

1. Epinephrine Hydrochloride U.S.P. 1 cc of 1:1000 solution (1 mg) I.M. IMMEDIATELY and repeat at 3-10 minutes as directed. It may be necessary to give 0.1 to 0.4 cc of 1:1000 solution diluted in 10 cc saline SLOWLY I.V.
2. Place in horizontal position. Keep warm.
3. Maintain adequate airway.
4. Diphenhydramine hydrochloride (Benadryl®) 50 mg I.V. immediately.
5. Positive pressure oxygen therapy (see p 148).
6. Amlopylline 0.24-0.48 Gm I.V. 10-20 min of saline SLOWLY I.V. may be of aid.

B. Prevention

1. Precautions. Be aware of the danger. Avoid using potentiated penicillins and penicillin G unless there is a definite need. Avoid giving drugs to patient with a history of hay fever.

them on other all right conditions not necessary. Do not administer drug to which a patient is idiosyncratically sensitive.

2. Simultaneous administration of antihistaminic drug. Reactions of frequency and severity of aaphylactic reaction by some of the antihistaminic drugs has been reported. Parenteral preparations of the various antihistaminic added to the drug dilutes and tends to be quiescent. Diphenhydramine hydrochloride (Benadryl) or triphenylmethine hydrochloride (Pyribamine) in 10 mg doses has been suggested. These antihistaminic do not guarantee safety against anaphylaxis in the hypersensitive individual.
3. Administration of corticotropin (ACTH) 12 hours prior to drug; this has been suggested but clinical experience is limited and at best difficult to evaluate. (CAUTION)
4. Description (p. 495)

Antihistaminic Drug

The antihistaminic drug is a group of chemically related agents which happen to block most of the characteristic effect of histamine. They do not block the release of histamine but evidently do prevent the histamine from reacting with the organ. In therapeutic doses they exert a depressant effect upon the CNS but in high doses they have a stimulant effect. They are of little or no life-threatening toxicity and are relatively safe to drug and for individual to the dual comparison but the putative effect of the antihistaminic should be highly significant effect.

A. Examples of common antihistaminic drugs. These drugs are given in the following table.

1. Substituted phenylamine derivatives (>NCCN<)
 a. Triphenylmethine hydrochloride USP (Pyribamine[®])
 50 mg
 b. Methapylin hydrochloride USP (Therapylin[®])
 Semko[®] 25-50 mg
 Triphenylmethine hydrochloride USP (Neohyramine[®])
 25-100 mg
 c. Pyribamine Maleate USP (Benadryl[®] Stang[®])
 25-50 mg

2. Alkylamine derivatives (OCCN<) Diphenhydramine hydrochloride USP (Benadryl[®]) 25-50 mg

3. Miscellaneous compounds (CCCC) Chlorpheniramine Maleate USP (Chlor-T[®]) 4 mg

B. Clinical effects. The antihistaminic may be said to have a number of effects on the central nervous system and on the peripheral nervous system. It is said to have a sedative effect and may be used in the treatment of allergic conditions. It is said to have a sedative effect and may be used in the treatment of allergic conditions.

C. Toxicity. The antihistaminic may produce drowsiness, headache, vomiting, diarrhea, and other effects. It is said to have a sedative effect and may be used in the treatment of allergic conditions.

Chapter 4

DIETETICS AND NUTRITION

A diet must supply the following essential components. These requirements can be normally met by including the basic foodstuffs as outlined on page 47. (The dietary components are altered as indicated for the needs of the individual.)

- A Calories for energy (supplied mainly by CHO intake)
- B Protein for growth, development, tissue repair and energy
- C CHO for energy and for prevention of ketosis
- D Fat for essential fatty acids and energy
- E Minerals and vitamins for maintenance of optimal tissue function and electrolyte equilibrium
- F Water for absorption and transport of foods and waste products and excretion

Modifying the Basic Diet

Personal, eating habits, racial and religious restrictions, expenses and geographic availability of food must be considered in the preparation of any diet. Otherwise the basic diet must be modified as follows:

- A Increase All or part of the diet must be increased to compensate with reference to the activity of increased metabolism (as in thyrotoxicosis, tissue injury and fever). (BMR is increased 13% with each 1°C, 7% with each 1°F of fever.)
- B Decrease In obesity the diet should contain calories, CHO and fat in decreased amounts.
- C Restricted Some diseases require specific restrictions in variations of one or more of the basic dietary constituents (see page 54).

PLANNING AND WRITING A DIET

The planning and writing of a diet can be accomplished by following the steps numbered below.

Prescribing the Diet

- | | Page |
|--|------|
| 1 Calculate the caloric need of the patient | 47 |
| 2 Include the basic foods for a well balanced diet | 47 |
| 3 Select the type of diet to be employed | 48 |
| 4 Calculate the variation of the dietary components as specified by the diet | 48 |

Selection of the Dietary Components and General Instructions

- | | |
|--|----|
| 5 Determine the portion in needs and select foods to be used | 49 |
| 6 Select the carbohydrate foods for the diet | 51 |
| 7 Determine the fat requirements and dietary sources | 52 |
| 8 Determine the need for vitamin supplements | 52 |
| 9 Determine the need for mineral supplements | 53 |
| 10 Arrange the number, frequency and time of feeding | 53 |
| 11 Give detailed instructions to the patient | 53 |

STEP 1 - CALCULATE THE CALORIC NEEDS OF THE PATIENT

The caloric needs vary with age, weight, activity, and nutritional status (see below). The caloric needs must be adjusted also to meet variations caused by disease or disorder (see page 46).

APPROXIMATE DAILY CALORIC ALLOWANCES (N.R.C. 1953)

Healthy persons 25 years of age U.S.A. (mean temp 10° C = 50° F)

Caloric for Standard	Vary Caloric Allowances as Follow
Men 65 Kg (143 lb) 170 cm (67 in) 3200 Calorie	Weight For each 5 kg over standard add Men + 5% Women + 6% For each 5 kg under standard subtract Men - 6% Women - 6%
Women 55 Kg (121 lb) 157 cm (62 in) 2300 Calorie	Temperature (Average Environmental) For each 10° warm decrease 5% For each 10° cooler increase 5%
Pregnant 3700 Cal Lactating 3300 Cal	Activity Vary to maintain weight

STEP 2 - INCLUDE THE BASIC FOODS FOR A WELL-BALANCED DIET

The well balanced diet should always include serving of the following food stuffs unless contraindicated. These basic foods must be kept in mind while writing the diet and are conveniently used as the nucleus of formulating most diets. The remainder of the diet is made up of increased quantities of foodstuffs from any of the groups. The high CHO foods supply needed also of energy and are the least expensive.

BASIC FOODSTUFFS

Foodstuff	Basic Requirement	Weight or Volume
High protein Food ■ 1 fish or fowl or 1 egg or dried 1 gum	1 serving	3 4 oz (90-120 Gm)
Eggs	1 or 2	1 1/2 3 oz (45-90 Gm)
Milk whole	Adult 2 glasses Child 4 glasses	16 (480 cc) 32 oz (960 cc)
Whole grain (cereal) 1 bread	1 serving	1 oz (30 Gm)
Vegetable 1 root 1 whole leafy 1 other	1 serving 1 serving 1 serving	4 oz (120 Gm) 2 oz (60 Gm) 3 (90 Gm)
Fruit 1 fresh (citrus tomato) 1 other	1 medium sized 1 serving	3 oz (90 Gm) 3 oz (90 Gm)
Fat Butter or tallow margarine	2 tablespoon	1 oz (30 Gm)

Individual weight (as background)

†Weight and limit of food stuff and not to the amounts of CHO of it they will yield

43 Types of Diets

When preparing the food always make the servings attractive to sight, taste and smell and serve at the proper temperature. The best planned diet is useless unless eaten by the patient.

STEP 3 - SELECT THE TYPE OF DIET TO BE EMPLOYED

After having calculated the basic caloric needs in Step 1, use the following table to help select the type of diet for the disease in question. Descriptive details of these diets will be found on pages 54 to 59.

THE PRINCIPAL TYPES OF DIETS

Disease or Disorder	Diet
Gastrointestinal Peptic ulcer Functional disorders	Modified Sippy Blind (low residue, soft consistency, non-stimulating)
Gallbladder disease Liver disease Constipation	Low fat and non-greasy forming High protein, high CHO High residue
Cardiovascular Congestive failure Hypertension	Low sodium (salt) Low sodium (less than 300 mg / day)
Metabolic Diabetes	Usually high protein with moderate CHO restriction (see page 57)
Obesity Wight loss and malnutrition	Low caloric, adequate protein High caloric, high protein, high vitamin
Renal Nephritis	Low but adequate protein 0.5 Gm / Kg (0.25 Gm / lb) body weight per day plus total albumin lost in urine
Allergic Food allergy	Special elimination

These diets vary in the number of calories and/or in the amount of one or more of the dietary components. The next step is to calculate these variations.

STEP 4 - CALCULATE THE VARIATION OF THE DIETARY COMPONENTS AS SPECIFIED BY THE DIET

After determining the basic caloric needs and selecting the type of diet, use the following table to calculate the number of calories and the amount of each dietary component for the diet. The remainder of the total calories not supplied by the fixed components of the diet may be made up with unrestricted foods.

VARIATIONS OF DIETARY COMPONENTS

Component	Average Diet	High or Increased	Low or Decreased
Calories (Energy)	Variable (See Step 1 page 4)	25-35% more or less than for maintenance	25-35% less than for maintenance
Protein	1 Gm./Kg. (0.5 Gm./lb.) body wt./day (See Step 5 below)	2-4 Gm./kg. (1-2 Gm./lb.) body wt./day (300 Gm. or about 1 lb. per 100 lb.)	0.5 Gm./Kg. (0.25 Gm./lb.) body wt./day (Should not be below)
CHO	50% of calories as CHO	75% or more of calories as CHO	About 25% of calories as CHO
Fat	About 100 Gm. per day	150-250 Gm. per day	70 Gm. or less per day
Vitamins	Supplied by well balanced diet (See page 47)	Excess of high vitamin foods or supplementation	Not indicated
Minerals			
Sodium	5-20 Gm./day	Above 20 Gm./day	0-2-3-8 Gm./day
Chlorine	0-1-1.5 Gm./day	Above 3 Gm./day	0-2-0.5 Gm./day
Note: If electrolytes are abundant the potassium may be as low as 0.3 Gm./Kg. (0.15 Gm./lb.) body wt. per day			

Having formed the diet in proper proportion (Step 14) in accordance with the actual diet by selecting food stuffs from the table in Step 5, 6, 7, 8 and 9 on the following pages.

The food stuffs must not only provide the desired dietary components but must also be made to fit the caloric specifications. Be careful of the energy content of protein in the diet as well as the highly variable fat content of the protein in food. It is advisable to balance dietary selection with protein in food. The CHO, fat and total calories will be the protein values of the various food stuffs must be kept in mind.

STEP 5 - DETERMINE THE PROTEIN NEEDS AND SELECT FOODS TO BE USED

Protein requirements vary so greatly with developmental tissue repair and as a source of energy. On Gm. of protein 4 Calories 100 Gm. of protein during the stable maintenance period will be 400 Gm. CHO.

RECOMMENDED DAILY PROTEIN ALLOWANCES (NRC, 1953)

	Amount per unit of body weight	
1. Adolescents	1.5-2.0 Gm./Kg.	0.7-0.9 Gm./lb.
2. Adults	1.0 Gm./Kg.	0.5 Gm./lb.
3. Pregnant women	1.5 Gm./Kg.	0.7 Gm./lb.
4. Lactating women	2.0 Gm./Kg.	0.9 Gm./lb.

Most of the protein requirements will be obtained from high protein foods which form the basis of the protein intake calculation. After determining the amount of protein needed for the diet select the high protein foods by the use of the table on the following page.

HIGH PROTEIN FOODS

These proteins are interchangeable in the diet. One serving yields about 6 Gm of protein; however, the total caloric content varies.

Food	Serving	Protein		CHO	Fat	Total
		Gm	Cal	Gm	Gm	Cal
Egg	1 small	6	24	0	6	75
Milk, skimmed	1 c in glass	6	24	10	0.6	65
Milk, whole	(200 cc)	8	32	10	8	130
Lean meat or fish	1 oz (fresh)	6	24	0	5	70
Fatty meat or fish	(30 Gm)	6	24	8	7	90
Fresh fowl	1 oz (30 Gm)	8	32	0	2	40
Cottage cheese	1 round d Tbsp.	6	24	1	0	30
Processed cheese	1 slice (1 oz.)	8	32	0.5	8	100
French soy beans	1/4 cup	6	24	2	3	60
Other legumes	1/2 cup	8	24	1.5	1	100
Nuts	1 oz	8	24	2	18	200

RELATIVE PROTEIN VALUES OF PROTEIN PORTION OF DIETS

Diets of more than 70 Gm or less than 40 Gm of protein can be calculated by either adding or dividing the basic portions. The table below is so arranged that proteins for low caloric (low fat) and normal or high caloric diets can be selected.

PROTEIN PORTIONS OF DIETS

For Low caloric (Low fat) Diet	For Normal or High caloric Diet
Cal	Cal
Yields 40 Gm or 160 Cal Protein	
1 Egg 75	1 Egg 75
2 Cups skim milk (400 cc) 130	2 Cups whole milk (400 cc) 260
3 1/2 oz meat (lean) 245	3 1/2 oz meat (med fat) 315
40	650
Yields 60 Gm or 200 Cal Protein	
1 Egg 75	1 Egg 75
2 Cups skim milk (400 cc) 130	2 Cups whole milk (400 cc) 260
2 Tbsp cottage cheese 60	2 Tbsp cottage cheese 60
3 1/2 oz meat (lean) 245	3 1/2 oz meat (med fat) 315
510	710
Yields 80 Gm or 240 Cal Protein	
1 Egg 75	1 Egg 75
2 Cups skim milk (400 cc) 130	2 Cups whole milk (400 cc) 260
1 1/2 Cup cottage cheese 240	1 1/2 Cup cottage cheese 240
3 1/2 oz meat (lean) 245	3 1/2 oz meat (med fat) 315
690	890
Yields 90 Gm or 360 Cal Protein	
1 Egg 75	1 Egg 75
2 Cups skim milk (400 cc) 130	2 Cups whole milk (400 cc) 260
1 1/2 Cup cottage cheese 240	1 1/2 Cup cottage cheese 240
5 oz meat (lean) 350	5 oz meat (med fat) 450
795	1075

*Total calories represent the caloric value derived from the carbohydrate, fat, and protein content of the foods listed.

STLP 6 - SELECT THE CARBOHYDRATE FOODS FOR THE DIET

Carbohydrates supply energy and usually constitute the largest part of the diet (about 50%). One Gm of CHO = 4 Cal. If adequate CHO are given, the proteins are spared as a source of energy. At least 10-15% of the diet must be CHO to prevent ketosis.

A For rough approximation of the CHO content of foods, the following figures will suffice. An average serving is approximately $\frac{1}{2}$ cup cooked or 1 cup raw vegetables or fruits.

Average Serving	Amount of CHO	Total Calories
Vegetable	4.8 Gm	25
Fruit	12.15 Gm	50
Shredded potatoes		
corn beans & peas	15.20 Gm	75

B For close approximation of the CHO content of food

1 5% vegetables and fruits: 100 Gm portion yields 3.7 Gm CHO, 1 Gm protein and approximately 3 Calories.

Asparagus (8 stalks)	Cucumber (20 slices)	Spinach (1 c)
Bamboo shoots (3/4 c)	Eggplant (2 slices)	String bean (1 c)
Bananas (1 lb)	Endive (1 head)	Summer squash (1 lb)
Beet greens (1 c)	Lettuce (1/3 head)	Tomato (1 small)
Bocconcini (1 c)	Mustard greens (1 c)	Turkey greens (1 c)
Cabbage (1 1/2 lb)	Okra (10 pods)	Cantaloupe (1/4)
Cauliflower (1 lb)	Paper greens (1 lb)	Rhubarb (1 lb)
Celery (8 stalks)	Radicchio (1 lb)	Stewed fruit (1 lb)
Chard (1 1/2 c)	Sauerkraut (2/3 c)	Watermelon (1/2 slice)

2 10% vegetables and fruits: 100 Gm portion yields 8.12 Gm CHO, 1 Gm protein and approximately 40 Calories.

Artichoke (3)	Onions (2)	Gooseberries (2/3 c)
Beet (2/3 lb)	Pumpkin (1/2 c)	Grapefruit (1/2 c)
Corn (1 lb)	Rutabaga (3/4 lb)	Honeydew melon (1/10)
Dandelion greens (1 c)	White turnip (3/4 lb)	Orange (1 lb)
Edam bean (1 lb)	Winter squash (1 lb)	Peach (1 large)
Lentil (4 stalks)	Cauliflower (1 lb)	Tangerine (2)

3 15% vegetables and fruits (for those who cannot do without vegetables): 100 Gm portion yields 12.17 Gm CHO, 1 Gm protein and approximately 50 Calories.

Apple (1 medium)	Cucumbers (1 lb)	Peas (3/4 lb)
Apricots (2)	Grape (1 c)	Pineapple (2 slices)
Blackberries (1 lb)	Loganberries (1 lb)	Plum (3)
Blackberries (2/3 lb)	Mint (2)	Raspberries (1 lb)
Cherries (1 lb)	Parsnip (1)	

4 High CHO food: Serving yields approximately 75-100 Calories.
1/2 cup of all macaroni, spaghetti, or rice (1 lb yield 2.5 Gm protein).

1/2 cup of pumpkin and potatoes (also yields 1 Gm protein).
1 slice of bread (also yields 2 Gm protein).

4 Cakes, quick lentils (also yields 2 Gm protein).
4 oz 3 graham, 5 p. 1 lb 3 oz 41 g protein or

1 1/2 g figs (also yields 1 Gm protein).
1 1/2 g 3 b. 2 heaping spoonful

52 Fat and Vitamins

■ B e g (Cal / 30 cc) (For milk see page 50) Black coffee
1 tea 8 ginger ale 1 beer 12 other carbonated be e ag s
15 dry win ■ sweet wine 40 liq ors 75 (Caloric values
for be r wine and liquo s are derived mainly from alcohol)

STEP 7 - DETERMINE THE FAT REQUIREMENTS AND THE DIETARY SOURCES

The requirements for fat are not known but fat forms an important source of food. 1 Gm fat = 9 Cal. Fats usually make up the remainder of the caloric intake after protein and CHO portions have been selected. Most protein-containing foods contain fat also; this must be calculated in determining total fat intake (see page 50).

The role of essential (unsaturated) fatty acids has recently been reemphasized. It has been shown that using 50-150 Gm per day of oil containing high concentrations of essential fatty acids plasma cholesterol can be lowered. The exact amounts of essential fatty acids and the precise role in human nutrition or human diseases are still unsettled. However, the average diet should probably contain essential fatty acids in adequate amounts. Some of the common edible oils and their average essential fatty acid (linoleic acid) content are as follows: safflower oil 70% corn oil 42% cottonseed oil 43% soy oil 54% olive oil 7%.

Caloric Values of Servings of Fats

Each of the following quantities about 40 Calories: 1 t p butter, 1 t p lard, 1 t p margarine, 1 t p mayonaise, 1 t p animal fat, 1 Tb p light cream, 1 t p oil, 1 strip bacon. (One square p t of butter or margarine equals 80-100 Calories.)

STEP 8 - DETERMINE THE NEED FOR VITAMIN SUPPLEMENTS

The normal daily requirements are adequately supplied by the basic diet shown on page 47. It is only in cases of restricted diet or harmful metabolic states (e.g., diabetes, fever, thyrotoxicosis, digestive absorption defect) that vitamin supplements may be necessary. For the specific dosages see pages 60 to 64.

DAILY ALLOWANCES OF VITAMINS (N R C 1953)

Vitamin and Daily Requirement	Natural Sources
A 5,000-8,000 I.U.	Vitamin A: Milk, butter, and lard oil; Carotene: pre-formed in carrots, sweet potatoes, spinach, and green leafy vegetables.
B ₁ Thiamin 1.2-1.6 mg	Yeast, meat, whole grain, and bran.
B ₂ Riboflavin 1.4-2.5 mg	Live egg yolk.
P P Nicotinamide 10-16 mg	Milk, yeast, meat, eggs, liver, meat.
C Ascorbic Acid 70-150 mg	Liver, yeast, meat, bran, whole wheat.
■ 400 U.I.	Citrus fruits, green peppers, parsley, tomatoes, cabbage, radishes.
	Battle liver, yellow fish liver oil.

STEP 9 - DETERMINE THE NEED FOR MINERAL SUPPLEMENTS

If the requirements of the minerals are supplied in a well balanced diet (see page 47) Additional amounts are required when an abnormal loss or increased demand arises the given mineral is likely to be absorbed as a drug. The deficiencies most likely to occur are those of calcium and iron. Iodine deficiency in endemic areas can be prevented if iodine salt is used.

DAILY ALLOWANCES OF MINERALS (N R 1953)

Mineral	Allowances	Nutritional Sources
Mineral requirements to be deficient		
Calcium	0.8 Gm for adults 1.5 Gm for pregnant lactating women	Milk and milk products (1 Gm calcium/qt)
Iron	12-15 mg for children 18-20 mg for women Less than 10 mg for infants	Liver, egg yolk, kidney, beef, whole wheat green vegetables
Mineral requirements to be deficient		
Copper	1-2 mg	Liver, egg yolk, bran, oysters
Iodine	0.12-0.3 mg	Iodized salt, Vegetables grown in iodine rich soil
Sodium	2-5 Gm	Table salt, milk, meat, eggs
Phosphorus	1-1.5 Gm (2-3 Gm during pregnancy)	Milk, liver, egg yolk, cereals, nutmegs
Potassium	1-4 Gm	All fruits and fruits

STEP 10 - ARRANGE THE NUMBER, FREQUENCY AND TIME OF FEEDING

In the management of infants, the most important consideration is the frequency and time of feeding. The condition in which the infant is important includes:

1. Malnutrition, fever, thyrotoxicosis, injury. Frequent nursing is required to maintain the infant's weight.
2. Premature. The infant must be fed frequently to maintain a constant body temperature.
3. Diarrhea. Frequent small feedings to maintain the infant's blood sugar.
4. Dehydration, constipation (e.g., postoperative). Frequent small feedings.

STEP 11 - GIVE DETAILED INSTRUCTIONS TO THE PATIENT

When the diet has been completely planned, carefully explain it to the patient in simple terms. Give the patient the following instructions: 1. The frequency and time of feeding. 2. The following diet will be given. 3. The following instructions.

PRINCIPAL TYPES OF DIETS

The following diets are planned around the Basic Foods which form the nucleus of a well balanced diet. See table on page 47.

Sippy Diets

Progressive non irritating buffering diets taken on regular schedule

Composition

- Stage I 3 oz (90 cc) half milk and half cream (18%) every hour from 7:00 a.m. to 7:00 p.m.
- Stage II Stage I plus 3 feedings of refined cereal (3 pe serving) and 1 soft cooked egg tid
- Stage III Stage II plus creamed soups and pureed vegetable
- Stage IV 3 (90 cc) milk and cream every hour plus regular meal of small feedings of lean meat, potato, pure dairy vegetable, refined cereals and breads, custard puddings, cream and butter.

Restrictions Meat extracts, bran, raw vegetables and fruits, tea, free condiments, pesticides, alcohol and alcoholic beverages.

Mulling's Diet

Employed in bleeding patients. As now generally employed means frequent feedings of pure foods. Originally described as follows:

- 8 a.m. Tea, white bread and butter
- 8 a.m. Oatmeal with milk, white bread and butter
- 1 p.m. Dinner. A menu has a red of meat, broiled chops, omelet, fish, vegetable, cream at or fish, gratin, mashed potatoes, vegetable puree or soups, creamed vegetable, stewed apples, apple sauce, gruel and rice and tapioca puddings.
- 3 p.m. Cocoa
- 6 p.m. White bread and butter, sliced meats, cheese and tea.

Bland Diet

Animal diet modified to be smooth, non irritating and bland in taste. May also be used as a low residue diet.

Composition Lean meats, fish, poultry, egg, milk, potato, pureed vegetable and fruit, refined cereals and bread, custards, puddings, gelatin desserts, cream, butter, margarine, salt and sugar in moderation.

Restrictions Fried food, raw vegetables, fruits and fruit juices, spices, condiments, bran, whole grain cereals and bread, carbonated beverages, alcohol and coffee.

Low Fat No Gas Formula Diet

Composition Lean meat, fish, poultry, skimmed milk, butter, milk, cottage cheese, cereal products, bread, vegetables and fruits except those listed below, gelatin desserts, sherbet, pudding without cream, sugars and jellies.

Restrictions Pork, ham, bacon, fatty cuts of any meat, cream, cabbage, cauliflower, onions, turnip, cucumber, radishes, green peppers, dried beans and peas, mung beans, raw apples, butter, margarine, mayonnaise, oil nuts, chocolate, fried foods, pastries and highly seasoned foods.

High prot i High CHO Low fat D t

Comp o t All w fat d t w t i e s s placed o l n g s e i n g s
of l a n m t g g k i m m e d m i l k o b u t t e r m i l k c o t i n g
c h e s e s a l s a d s f a t j u i s u g a r a n d j e l l y T o c l
c u l t e s d f i n i t e a m o u n t o f p o t i n f o t h i d i e t s e e t a b l e o n
p a g e 50

R e s t r i c t i o n s, S m a l l r l o w f a t n o n g a s f o r m i n g d i e t

High resid e Diet

A normal diet with a maximum of bulk

Comp o t i All of th b a i f o o d s w i t h e x t r a r v i n g s o f w h o l e
g r a i n s a n d b r e a d s r w v e g e t a b l e s a n d f r u i t s a d a n
a d e q u a t e a m o u n t o f f l u i d s

R e s t r i c t i o n N o n

D i e t s i c t d i n S o d i u m C o n t e n t

S o d i u m r a t e d d i e t s u s u a l l y e m p l o y 1.5 G m . o f s o d i u m
(3.75 G m . s o d i u m c h l o r i d e) o r u n d e r F o r b e s t h e p e u t i c r
s u l t d i e t s s h o u l d c o n t a i n l e s s t h a n 500 m g . o f s o d i u m (1.5 G m .
s o d i u m h l o r i d e)

T h e f o l l o w i n g t w o l o w s o d i u m d i e t s b o t h c o n t a i n 2,000 C a l o r i e s

T h e y r e t h e s a m e n c o m p o s i t i o n e x c e p t f o r t h e b e v e r a g e

250 mg s o d i u m d i e t s e e L o n a l e a b e v e r a g e

300 mg s o d i u m d i e t s e e w h o l e m i l k a b e v e r a g e

B r e a k f a s t

<u>F r u i t</u>	$\frac{1}{2}$ c p
S l i f e c o k e d r p u f f d c a l	$\frac{1}{2}$ c p
S a l t f e e b d	1 s a l i c e
S l i f e b n m g i n	2 t p (1 p a t)
<u>E g g</u>	1
L o n a l c ^o o r w h o l e m i l k	$\frac{1}{2}$ p

N o o n a n d E v e n i n g M e a l s

S l i f e s t e a m t	$2\frac{1}{2}$ o
S l i f e p o t t o o i	$\frac{1}{2}$ u p
S a l t f e c o k e d o r w v e g e t a b l e s	s a d i r d
S l i f b r e d	1 s a l i c e
S l i f e b u t t e r o r m a g i n e	2 t s p (1 p t)
<u>F u i</u>	$\frac{1}{2}$ u p
L o n a l c ^o o r w h o l e m i l k	8 o z

A l l o t t i n g (S e e R e s t r i c t i o n o n F o l l o w i n g P a g e)

- 1 L o a l e s a p p r d b y m i n g $\frac{1}{2}$ u p d y p w d w t h 2
u p s o f w t t h a m y b f l o d w i t h h o l a t
- 2 T m k s f r m g i n w h a n d k n e a d m g i n i n
f l v h a n g e o f o l d w t
- 3 U f h o f o z n w g t b l s p l s t f r a n d
g i b l M y u s r t h k e b e t o t s p i n h a n d
o t h g t w i w e k l y
- 4 U n l y f h o k d f u t
- 5 U o l y g r a n u l t d g l t i n i n s a l a d a n d d
- 6 M y u c p p h b e a n d o t h e s p i
- 7 M y u o n e o f t h o d m f s a l t u b t i t u t e

B Restrictions

- 1 Ham bacon bacon fat salt pork corned beef or pork luncheon meats canned meats fish or poultry
- 2 Prepared cereals with salt quick cooking cereals breads leavened with baking powder or baking soda
- 3 Prepared foods or prepared desserts
- 4 Canned vegetables dried fruits commercial salad dressings catsup
- 5 Salted nuts salted popcorn potato chips
- 6 Garlic salt onion salt celery salt salt baking powder baking soda
- 7 Celery olives pickles rishes chard
- 8 To avoid distention Cabbage family onions turnips peppera dried beans cucumbers sweet potatoes raw apples melons

C Approximate Sodium Content of Common Foods (in mg per serving) This list gives the natural content without the addition of salt baking powder or baking soda

- 1 Fresh meat fish and poultry $3\frac{1}{2}$ oz (100 Gm) serving

Lamb	78	Oyster	73	Chicken leg	110
Pork	58	Cod fish	80	Turkey leg	92
Beef	51	Hamburger	55	Chicken breast	78
Veal	48	Salmon	48	Turkey breast	40
- 2 Egg (1) 40
- 3 Milk 7 oz glass (200 cc) Cultured buttermilk 270 fresh whole milk 110 sweetened whole milk (Longlac®) 3
- 4 Cheese 1 oz (30 Gm) Processed 450 cheddar 210 cottage 100 cream 75
- 5 Legumes $\frac{1}{2}$ cup (4 oz or 120 Gm) fresh or $\frac{1}{8}$ cup (1 oz or 30 Gm) dry Beans and corn 0 split peas dry 42
- 6 Cereals 1 oz (30 Gm) dry $\frac{1}{4}$ cup whole grain cereals or pastes (macaroni, etc.) 0 5 4 1 cup dry wild rice 120 350 puffed cereals 1
- 7 Bread (1 slice) and crackers

Commercial bread	180-250	88 dactyls	930
Yeast bread without salt	0 5	Mat oth plain	0 3
- 8 Vegetables $3\frac{1}{2}$ oz (100 Gm) serving of fresh or frozen (not canned) (For sizes of serving see pag 51)

Artichoke	43	Cabbage	5	Endive	11	Potato	
Asparagus	2	Carrots	31	Kale	110	Skim milk	0 6
Beans	1 2	Cauliflower	34	Lettuce	12	Pumpkin	0 4
frozen	2	Chard	200	Okra pods	1	Spinach	82
Beets	110	Celery	110	Onion	1	Squash	0 5
Broccoli	16	Corn	trace	Peas	7	Tomato	3
Brussels		frozen	9	Peas	0 9	Turnip	37
sprouts	16	Eggplant	1	French	100		
- 9 Fruits $3\frac{1}{2}$ oz (100 Gm) serving (if ripe see pag 51)

Fresh canned and frozen fruits	contains less than 10 mg sodium per serving
--------------------------------	---
- 10 Fats 10 Gm (2 teaspoons)

Margarine	110	Sweet butter	0 5	Shortening	1
Regular butter	98	Oil	0 2	Lard	0 3
- 11 Sweets 10 Gm (2 teaspoons)

Sugar	minute amounts	honey	2 0	jelly	0 2
-------	----------------	-------	-----	-------	-----

1 Miscellaneous
 Herbs 13 Coca Cola® 1 bottle 18
 Grains 13 Nuts 1 oz (30 Gm) 0.5
 Coffee, tea, natural herbs and condiments out in only
 negligible amounts of sodium

Diet c Diet

A calculated diet with equalized amounts of protein, fat, and carbohydrate

1800 Calo

Breakfast (7:00-9:00 a.m.)
 1/2 cup 10% fruit
 2 eggs any style
 1 tsp butter or margarine
 1 glass skimmed milk

Morning Feeding (10:00 a.m.)
 1 glass skimmed milk
 1 lb cube processed cheese
 round of Tbsp nuts

Midday (12:00-1:00 p.m.)
 3 any lean meat
 black or fish
 1/2 cup 5% vegetable
 1/3 cup 5% vegetable
 1 lb 5% vegetable
 2 t p butter or margarin
 1/2 c p 10% fruit
 1 glass milk

Afternoon Feeding (3:00 p.m.)
 1 glass skimmed milk
 1 lb cube of Tbsp nuts
 1/2 nut butter

Morning Meal (6:00-7:00 p.m.)
 3 any lean meat
 black or fish
 1/2 cup 5% vegetable
 1/3 p 5% vegetable
 1 lb 5% vegetable
 2 t p butter or margarin
 1/2 up 10% fruit
 1 glass milk

Bedtime Feeding (9:00-10:00 p.m.)
 1 glass skimmed milk
 1/2 up (and) cottage
 cheese

2500 Calo

Breakfast (7:00-9:00 a.m.)
 1/2 up 10% fruit
 2 eggs any style
 2 strips bacon (1 p)
 Coffee or tea as desired

Morning Feeding (10:00 a.m.)
 1 up whole milk
 2 lb in cube processed
 cheese or 1/3 up peanuts

Noon Meal (12:00-1:00 p.m.)
 1/2 c p cottage cheese
 1/2 up 5% vegetable
 1/2 p 10% vegetable
 1/2 cup 10% fruit
 2 t p butter or margarin
 1 cup whole milk
 Coffee or tea as desired

Afternoon Feeding (3:00 p.m.)
 1 up whole milk
 2 lb in cube processed
 cheese or 1/3 cup peanuts

Evening Meal (6:00-7:00 p.m.)
 4 lean meat chicken
 fish
 1/2 p 5% vegetable
 1/2 cup 10% vegetable
 1/2 up 10% fruit
 2 t p butter or margarin
 1 up skimmed milk
 Coffee or tea as desired

Bedtime Feeding (9:00-10:00 p.m.)
 1 up whole milk
 2 lb in cube processed
 cheese or 1/3 up peanuts

Diets

High calorie High protein High vitamin Diet

A normal diet containing extra foods high in protein and all of the vitamins

Composition All of the basic foods with increased amounts of meat fish poultry or eggs milk cheese whole grain cereals carrots green vegetables citrus fruit butter or margarine (see table on page 58 for high protein foods and table on page 59 for high vitamin foods)

Restrictions None

Low calorie Diets

Highly diets containing adequate protein which are low in calories than the patient's daily requirement (see page 47) The amount of food listed in each diet is the total daily intake

1200 Calorie Diet

5 oz meat fish poultry or cheese

1 egg

1 pt skimmed milk or buttermilk

1 slice bread

1 serving (1½ cup) potato or equivalent

2 servings 10% vegetables

3-4 servings 5% vegetables

2 servings 10% fresh fruit

1 serving 15% fresh fruit

2 tsp butter or margarine

1000 Calorie Diet

Omit the following from the 1200 Calorie diet

1 serving potato 1 serving 5% vegetables

1 serving 10% vegetable 1 tsp butter

800 Calorie Diet

3 oz lean meat fish or poultry

2 oz cottage cheese

1 slice bread

1 serving 10% vegetables

3 servings 5% vegetables

3 servings 10% fruit

1 pt skimmed milk or buttermilk

1500 Calorie Diet

Add the following to the 1200 Calorie diet

2 slice bread

3 tsp butter or margarine

1 serving 15% fruit

Restrictions All foods candy and beer except those listed

Low protein Diet

A normal diet with the protein foods limited to the minimum biologically adequate amount

Special Elimination Diet

A normal diet containing no foods suspected of causing allergic reactions. Such reactions reproduced most frequently by wheat eggs and milk less frequently by citrus fruits chocolate and fish. Other foods may infrequently cause reactions.

More specialized diets have been prepared by allergists and are used both diagnostically and therapeutically. Consult books on allergy for these diets.

Low purin Diet

Diet low in protein
 Food Forbidden Liver kidney sweets ads sardines anchovies
 beans whole grain products gravy soup meat extracts
 asparagus bean cauliflower peas lentils and mushrooms
 Food Restricted All other meat fish and fowl
 Composed of All other foods are allowed Most protein to be
 derived from eggs and dairy products

TUBE FEEDINGS

Tube feeding is employed when patient is unable to swallow
 to take food by mouth. A convenient means of administering the
 feeding is with a small polyethylene tube passed into the esophagus.
 Many food mixtures may be given throughly equipped with the
 the food be fluid or in a suspension of very small particles.

Protein hydrolytes are often irritating. Formula containing
 egg yolk to occlude the lamina of esophagus. Excellent formulas
 can be prepared by using milk (occasionally hot in tube) calcium
 caseinate, Lactogen[®] or trained material, sucrose, glucose
 and much as solid may be added if emulsified with Tween 80[®]
 as milk agent. Vitamins, minerals are added as indicated.
 Example of tube feeding formula as follows

1. Low protein high potassium diet. Supply 3,000 Calories
 per 3,000 c (5 C l /) contains 133 Gm protein
 Sterilized condensed milk 400 Gm (4 cans)
 Tomato juice 1900 c
 Prune juice 90 c
 All purpose Soybean oil 200 Gm
 Lactogen 315 Gm (1 1/3 cup)
 Water 3000 c
2. Experimental high potassium formula. 3,000 Calories per
 3,000 c (5 C l /) contains 120 Gm protein
 Homogenized milk 2200
 1/2 milk and 1/2 cream 600 c
 Eggs 6
 Dextrose monohydrate 7 Tbsp
3. Low sodium high potassium formula. 3,000 Calories per
 3,000 c contains 150 Gm protein 78 mg sodium
 Lactogen 600 Gm
 Water 3000 c

THE VITAMINS

The vitamins are organic substances that are essential for life which
 must be supplied to the organism from the diet. They are
 a distinct group of substances as they are not synthesized in
 important metabolic processes. The body stores of vitamins
 will be exhausted. Although they are not nutrients, they do not
 require vitamins for their synthesis. Although they are not nutrients, they do not
 require vitamins for their synthesis.

58 Diets

High also = High protein High Vitamin Diet

A normal diet containing extra foods high in protein and all of the vitamins

Composition All of the basic foods with increased amounts of meat fish poultry live eggs milk cheese whole grain cereals carrots green vegetables citrus fruits butter or margarine (see table on page 58 for high protein foods and table on page 58 for high vitamin foods)

Restrictions None

Low Calorie Diet

Bulky diets containing adequate protein which are lower in calories than the patient's daily requirement (see page 47). The amount of food listed in each diet is the total daily intake

1200 Calorie Diet

5 oz meat fish poultry or cheese
1 egg
1 pt skimmed milk or buttermilk
1 slice bread
1 serving (1/2 cup) potato or equiv lent
2 servings 10% vegetable
3 4 servings 5% vegetable
2 servings 10% fresh fruit
1 serving 15% fresh fruit
2 tsp butter or margarine

1000 Calorie Diet

Omit the following from the 1200 Calorie diet

1 serving potato 1 serving 5% vegetable
1 serving 10% vegetable 1 tsp butter

800 Calorie Diet

3 oz lean meat fish or poultry
2 oz cottage cheese
1 slice bread
1 serving 10% vegetable
3 servings 5% vegetable
3 servings 10% fruit
1 pt skimmed milk or buttermilk

1500 Calorie Diet

Add the following to the 1200 Calorie diet
2 slices bread
3 tsp butter or margarine
1 serving 15% fruit

Restrictions All foods candy and beverages except the salted

Low Protein Diet

A normal diet with the protein foods limited to the minimum but adequate amount

Special Elimination Diet

A normal diet containing foods specified of single allergenic reaction. Such reactions are produced most frequently by wheat egg and milk less frequently by citrus and chocolate and fish. Other foods may frequently cause reactions.

No specialized diets have been prepared by all diets and are used both diagnostically and therapeutically. Consult books on allergy for these diets.

Avitaminosis D (Code No 010 754)

Avitaminosis D is usually due to inadequate intake of sunlight or absorption defect

A Clinical Features Lack of vitamin D leads to tetany in children which is known asrickets (see page 380)

B Treatment Supplement calcium and phosphorus may be necessary if the diet is deficient in phosphorus. In cases of hypoparathyroidism, parathyroid hormone extract is given.

C Prevention See Tetany page 380

VITAMIN E

Vitamin E plays a role in normal physiology of some animals but there is no good evidence of its activity in man. It is relatively stable. It has been used without apparent benefit in some cases of habitual abortion, various neurological syndromes and heart disease. Dose of 30-100 mg of tocopherol daily.

VITAMIN K

The vitamins K are chemical compounds necessary for prothrombin synthesis by the liver and also important in the blood coagulation mechanism. They are widely distributed in all vegetables, fruits and animal products. They are also synthesized by microorganisms in the intestine. All vitamins K are fat soluble.

Vitamin K (Code No 010 765)

A Properties Vitamin K is formed in the liver and is fat soluble. It is important in the blood coagulation mechanism. It is widely distributed in all vegetables, fruits and animal products. It is also synthesized by microorganisms in the intestine.

B Treatment Bleeding from various causes may be treated with Vitamin K.

C Prevention Prolonged prothrombin time

1. Prevention Vitamin K deficiency is rare in healthy individuals.
2. Prevention Vitamin K deficiency is rare in healthy individuals.
3. Prevention Vitamin K deficiency is rare in healthy individuals.

WATER SOLUBLE VITAMINS

VITAMIN B COMPLEX

The members of the vitamin B complex are very intimately associated with each other in function. A deficiency of one of the vitamins of the complex usually results in a deficiency of the whole complex. The deficiency of the whole complex is known as beriberi. The deficiency of the whole complex is known as beriberi. The deficiency of the whole complex is known as beriberi.

80 Vitamins

In illness there may be considerable variation in the body requirements depending upon age, activity, diet, metabolic rate and other factors affecting the absorption, utilization and excretion of vitamins. Vitamin deficiencies are almost always multiple, particularly of fat soluble or B complex vitamins as a group. Early signs of vitamin deficiency are usually nonspecific, vague and mild and are easily misinterpreted or missed entirely. The crude sources of the vitamins are often more efficacious in therapy than the pure or synthetic. Only during the most severe phases of the deficiencies is it usually necessary to resort to the use of pure vitamins. The use of a pure vitamin in the face of a true multiple vitamin deficiency may aggravate rather than help the condition. Treatment of vitamin deficiencies requires an adequate balanced high protein and high vitamin diet in addition to necessary vitamin supplements. In general, it is wise to use vitamins therapeutically in 5-10 times the amount required for daily maintenance.

FAT-SOLUBLE VITAMINS

VITAMIN A

Vitamin A is an alcohol of high molecular weight which is converted from β -carotene in foods by the liver. It is necessary for normal function and structure of all epithelial cells and for synthesis of visual purple in retinal rods (necessary for vision in dim light). It is present in leafy green and yellow fruits and vegetables, whole milk, butter, eggs. Recommended daily allowances for adults are 5000 I.U. (6 U.S.P. units) during pregnancy and lactation, 6000 to 8000 I.U. Toxicity: 500,000 to 1,000,000 I.U. daily may cause alopecia, itching and bone pain from periosteal proliferation.

Vitamin A (Code No. 010 761)

- A Mild or Early Manifestations Dryness of the skin, night blindness and follicular hyperkeratosis.
- B Severe or Late Manifestations Xerophthalmia, atrophy and keratinization of the skin and keratomalacia.
- C Tests for Deficiency Dark adaptation is impaired. Low blood levels of carotenoids. Vitamin A may be helpful or a therapeutic test with 25,000 to 75,000 I.U. daily for 4 weeks.
- D Treatment Of ovitamins A U.S.P. Vitamin A B.P. 15,000 to 25,000 I.U. or 600 to 1,000 units daily. If absorption defective, it may be necessary to administer bile salts with the vitamin A or to give the same dosage in oil (M (50,000 units/cc in sesame oil). Skin lesions may require moist atmosphere.

VITAMIN D

The vitamin D are sterols formed in the animal body by ultraviolet irradiation of plant sterol precursors. They increase calcium absorption from the intestine and urinary phosphorus excretion. They are present in fish livers, their precursors are widely distributed in plants. Allowances for adults are not known. For children and during pregnancy and lactation 400 I.U. (or U.S.P. units) are recommended. Toxicity: 150,000 I.U. or more daily causes elevated serum calcium with metastatic calcification.

■ Vitamins

must always be supplied in the presence of adequate (dietary or parenteral) sources of all of the other members of the B complex. Water soluble vitamins should be administered in divided doses throughout the day to prevent excessive loss in the urine.

VITAMIN B₁ (Thiamine Hydrochloride)

Vitamin B₁ is the coenzyme for decarboxylation of α keto acids (e.g. pyruvic & ketoglutaric). It is important therefore for normal carbohydrate oxidation. Dietary sources are liver, lean pork, kidney and whole grain cereals. Steaming or exposure to moist heat reduces the thiamine content of foods. Daily dietary allowances are about 0.5 mg per 1000 Calories (avg. 1.2-1.6 mg per day).

Avitaminosis B₁ (Beriberi) (Code No. 010 7621)

Avitaminosis B₁ results from an inadequate intake due usually to idiosyncrasies of diet or excessive cooking or processing of foods. The increased need for vitamin B₁ during fever, high CHO intake or thyrotoxicosis may lead to a deficiency.

A. Mild or Early Manifestations Vague multiple complaints suggesting neurasthenia and include anorexia, formication and muscle cramps, tenderness of calves, paresthesias and hyperactivity followed later by hypoactivity of knee and ankle jerks.

B. Severe or Late Manifestations (Beriberi) Severe anorexia, polyneuritis, serous effusions, subcutaneous edema, paralysis (particularly in extremities) and cardiac insufficiency manifested by tachycardia, dyspnea, edema and normal or decreased circulation time, elevated venous pressure and non-specific ECG changes.

C. Treatment

1. Thiamine Hydrochloride U.S.P. (Aneurin Hydrochloride B.P.) 20-30 mg orally I.V. or I.M. daily in divided doses for 2 weeks, then 10 mg daily orally.

2. Dried Yeast Tablets U.S.M. (brewer's yeast) 30 Gm t.i.d.

3. Well balanced (2500-4500 Calories) diet when tolerated.

VITAMIN B₂ (Riboflavin)

Riboflavin serves as coenzyme for hydrogen transfer. It is present in milk and milk products, leafy green vegetables and liver. Daily dietary allowances for adults are 1.4-1.8 mg in pregnancy and lactation 2.2-5 mg.

Avitaminosis B₂ (Ariboflavinosis) (Code No. 010 7622)

The histological features of ariboflavinosis are similar to those of thiamine deficiency but inadequate intake of milk is important. The manifestations of deficiency usually occur along with thiamin and niacin deficiency but may occur earlier.

A. Mild or Early Manifestation Oral pain, superficial fissuring at angles of mouth, conjunctivitis and photophobia, lack of vigor, malaise, weakness and weight loss.

B. Severe or Late Manifestations Cheilosis (fissuring at the angles of the mouth), fissuring of the nares, magenta tongue.

with moderate to severe dysphagia, corneal vascularization and
irritation or corneal injury and rheumatic dermatitis

C Treatment

- 1 Riboflavin U S P B P 40-50 mg I V I M or orally daily until all symptoms have cleared
- 2 Dried Yeast Tablet U S P (baker's yeast) 30 Gm t i d
- 3 Well balanced (2500-4500 Calories) diet when tolerated

NICOTINIC ACID (Niacin) AND NICOTINAMIDE (Niacinamide)

Niacin and nicotinamide function as important enzymes systems concerned with reversible oxidation and reduction. They are present in many of the most whole grain cereals and peanuts. Daily allowance for adults is 10-15 mg for adolescents 13-18 mg. Niacin may be used therapeutically as a vasodilating agent for headache, myalgias, neurological disorders and edema of the labyrinth (100 mg orally daily in divided doses). Niacinamide does not possess this vasodilating effect.

Pellagra (Code No. 010 7623)

The etiological factors of deficiency are similar to those of thiamine deficiency. Niacin deficiency is the principal but not the only dietary defect in pellagra.

- A Mild or Easily Manifestations Multiple vague complaints and swollen, rough red skin. Redness and hypertrophy of the papillae of the tongue.
- B Severe or Late Manifestations Marked roughening of skin when exposed to light and diarrhea abdominal distention, enlarged tongue with atrophy of papillae, mental depression, clouding of mentality, rigidity and peculiar sickening sensation.
- C Treatment
 - 1 Specific measures
 - a Nicotinamide U S P B P (niacinamide) 30-500 mg I M I V or orally daily until symptoms subside
 - Nicotinic Acid U S P B P (nicotinic) is less often used because of its vasodilating effect if dosage is similar
 - b Supplementary vitamins Give therapeutic doses of thiamine, riboflavin and pyridoxine
 - c Dried Yeast Tablet U S P 30 Gm t i d
 - 2 General measures
 - a Well balanced (2500-4500 Calories) high protein diet
 - b Symptoms and progressive manifestations indicate Dementia may require constant supervision

VITAMIN C (Ascorbic Acid)

Vitamin C is concerned with formation and maintenance of intercellular supporting structures (dentine cartilage collagen bone matrix). It biochemically acts as a known Dietary source in citrus fruit, tomato, paprika, bell pepper, guava, green cabbage. Ascorbic acid content of foods is markedly decreased by cooking, mashing, contact with alkali and contact with oxygen. Daily allowance for adults is 70-75 mg daily during pregnancy and lactation 100-150 mg. Ascorbic acid has also been used in the treatment of certain poisons in doses of 0.5 Gm or

must always be supplied in the presence of adequate (dietary or parenteral) sources of all of the other members of the B complex. Water-soluble vitamins should be administered in divided doses throughout the day to prevent excessive loss in the urine.

VITAMIN B₁ (Thiamine Hydrochloride)

Vitamin B₁ is the coenzyme for decarboxylation of α -keto acids (e.g., pyruvic or ketoglutaric). It is important therefore for normal carbohydrate oxidation. Dietary sources are liver, lean pork, kidney and whole grain cereals. Steaming or exposure to moist heat reduces the thiamine content of foods. Daily dietary allowances are about 0.5 mg per 1000 Calories (avg. 1.2 to 1.6 mg per day).

Avitaminosis B₁ (Beriberi) (Code No. 010 7621)

Avitaminosis B₁ results from an inadequate intake due usually to idiosyncrasies of diet or excessive cooking or processing of foods. The increased need for vitamin B₁ during fever, high CHO intake or thyrotoxicosis may lead to a deficiency.

A Mild or Early Manifestations Give multiple complaints suggesting neurasthenia and include anorexia, formication and muscle cramp, tenderness of shins, paresthesias and hyperactivity followed later by hypoactivity of knee and ankle jerks.

B Severe or Late Manifestations (Beriberi) Severe anorexia, polyneuritis, serous effusions, subcutaneous edema, paresthesias (particularly in extremities) and cardiac insufficiency manifested by tachycardia, dyspnea, edema and normal or decreased circulation time, elevated venous pressure and non-specific ECG changes.

C Treatment

1. Thiamine Hydrochloride U.S.P. (Aneurine Hydrochloride B.P.) 20-50 mg orally I.V. as indicated daily in divided doses for 2 weeks then 10 mg daily orally.
2. Dried Yeast Tablets U.S.P. (brewer's yeast) 30 Gm t.i.d.
3. Well-balanced (2500-4500 Calorie) diet when tolerated.

VITAMIN B₂ (Riboflavin)

Riboflavin serves as coenzyme for hydrogen transfer. It is present in milk and milk products, leafy green vegetables and liver. Daily dietary allowances for adults are 1.4 to 1.6 mg in pregnancy and lactation 2.2 to 5 mg.

Avitaminosis B₂ (Ariboflavinosis) (Code No. 010 7622)

The etiologic factors of ariboflavinosis are similar to those of thiamine deficiency but inadequate intake of milk is important. The manifestations of deficiency usually occur along with thiamine and niacin deficiency but may occur separately.

A Mild or Early Manifestations Oral pallor, superficial fissuring at angle of mouth, conjunctivitis and photophobia, lack of vigor, malaise, weakness and weight loss.

B Severe or Late Manifestations Cheilosis (fissuring at the angles of the mouth), fissuring of the nares, magent tongue.

DISEASES OF THE SKIN

 to | the | total | amount | and | em |

64 Vitamins

more Proof of its value is lacking It is used in dosage up to 200 mg daily orally for healing wounds or ulcers or during recovery from protracted disease (e.g. tuberculosis)

Avitaminosis C (Scurvy) (Code No. 010 763)

Scurvy is usually due to inadequate intake but may occur with increased metabolic needs

A Mild or Early Manifestation Edema and hemorrhage fingering porosity of dentin hyperkeratotic hair follicles

B Severe or Late Manifestation Severe muscle changes swelling of the joints rickets of bone marked bleeding tendency extravasation of blood into fascial layers anemia loss of teeth and poor wound healing

C Tests for Deficiency Capillary resistance is reduced and x-ray of long bones may show typical changes There is also a lowered folic acid or white blood cell ascorbic acid levels

D Treatment

1 Deficiency Sodium Ascorbate Ijection to U.S.P. 0.5 to 1 Gm I.V. or 1 M daily and dedose as long as deficiency lasts A or B Acid U.S.P. B.P. may be given orally about the same dosage

2 Increased demand Ascorbic Acid U.S.P. 200-300 mg per day orally

OTHER VITAMINS

Many other vitamins have been characterized Some are important in human nutrition and some are still being known about Among them are important with all general clinical fulfillment

Pyridoxine Hydrochloride May be important in certain conditions of decarboxylation of proteins () May relieve some symptoms of weakness and irritability in the nervous system and may elevate the glossitis and help in the treatment of riboflavin deficiency (if any) in human the sclerotic is effective in the dosage 10-50 mg I.V. or I.M. daily with other factors of the B complex

Choline Found in phospholipids and methyl donor for allotropic substances and a growth factor It is found in large quantities in yeast It has been used to treat fatty livers in the liver chyma in human liver disease

Folic Acid (Pteroylglutamic Acid L. C. factor) Seems to be essential for the metabolism of certain nucleic materials Effective in certain megaloblastic anemia (see p. 222)

Vitamin B₁₂ (Cyanocobalamin) A phosphorus and cobalt containing material is isolated from the soil bacterium probably the first to be prepared in large quantities in the laboratory (see p. 222)

Vitamin P (Rutin Hydroxy Methyl Chalcone) These are the substances which are essential for the growth and development of the endothelium of response of the peripheral circulation to peripheral disease Their role in human disease is questionable Dosage: Hesperidin methyl chalcone 0.5-1 Gm daily orally Rutin 20-40 mg tid qid orally

Inositol It has been known to be a lipotropic substance and is obtained very specifically in some species of animal Its role in human nutrition and its use in liver disease is still unclear

Miscellaneous The roles of pantoic acid and pyruvic acid as aminobenzoic acid and biotin in humans are undetermined

- do der d et th r py e cordingly
- 3 E t l i r r t a n t (g r o u g h c l o t h g o r p a t o a l t i a n t a) h o u d b a i d d
- 4 B a t h i n g p c t i c e S o a p h o u d b e a o i d e d i n i n d i d u a l s w t h d r y o r i r t t e d s k i n S t c h i t h m a y b e u e d (s e p r e v i o u s p a g e)
- 5 N a l a i l u d b k p t t u m m d a n d c l a n d
- 6 A o d a t c h u n g , i f p o s s i b l b e c a s f v i c o u c y c l w h c h a n b e t b l a s h e d
- 7 U n n e s s y m e d c a t o n h o u d b e s t o p p d s u n c e m e d c a t n i t s i l l a n o f n p d u e p i t u
- 8 A n t p r u t i c d g T h f o l l w i n g a g n t s m y b e o f b e n f i t
- Cal m G l c n a t I n j e c t i U S P 10 f V l o w l y o n d a i l y o e v e r y o t h e r d a y
- A n t h t a m u n d r u g m y b e t r i e d i n r t i n c a s s f p r i t s o f a l l g e o r u n d e r m i n e d o l o g y F o a l i s t o f m m o n l y u d a n t i b i o t m i n i p r e p a r a t i o n s p a g e 45
- E p u n p h n I n j e c t n U S P 0 25 1 0 c (4 1 5 m i n) o f 1 1 0 0 0 a o l u t n e v e r y 4 h o u s m y b f v a l e i n a u t c a s s s p i d o f b i n g d u e t a l l g y (r t a)
- d P h n b b i l U S P 0 8 15 0 03 G m (4 4 1/2 g) b i d o q d m y p r o d u f l e d i t i o n n a g t l e d r e m o t e a l l y d u i t e d p t i t R m m b t h t b b i r t t h m l m a y p r o d e d m a t t (e l y) A t h e m t h e r p y S o m d m t o l o g i s t s d v i s t h e i n j e c t i o n o f 1 0 c o f t h e p t i n t a w h o l e v e n o u b l o o d i t o t h h p m u s l y 4 8 h o u s f o r 3 a j t i o
- f C i o t o p I n j e t o n U S P S p a g e 424

DERMATITIS VENENATA (Contact Dermatitis)

(code No 110 3001)

(Dermatitis Venerata Due to Plant Irritants code No 110 378)

An cut o i l d m a t t i s w h i h r u l t s f o m d i r e i o n t t f c h m i l o o t h e r t a n t s w i t h t h e s k i n L e a o n m o t o f f n o n e p o s s e d p r i s a n d m y b a s y m m t i c a l (f d t o u n i n l g e n t s) L e s i o n a g g r v a t d b y x p o s u r t o t h i r r i t a n t a n d t h s h o l d b a v o i d e d P a t h t t e m y b o f v a l u e i n d g n s e c o o b a t i o n o f l i n i a l i m p r e o n s

Diagnosis

Su v y t h p t i s v i n u m n t a n d s t u d y h t o t l a t i v i t i e s t d t e r m i n i r r i t a n t

A ■ c h f a h u s t y o f r e n t e x p r t n e w h e m i c a l d u g s s o a p o e m e t r o t h o u t t i l t a n t s T h e l c a t s o f t h l a i m y b e f v a l u e i n i d n t i f y i n g t h l i a n t e g l p (r u n e o h m p o o) f (s o p e h v i n g m t i l o m t i) e c k (j e w t r y c l o t h i n g) t r a n k (c l t h u n g) u p p e x t m i t i (p e o m t i p l a n t t o x i n i n d u s t a l i m m a l) a n d l o w e x t r e m i t i (t o c k i n g s h o e s h o e d y e s)

COMMON DISORDERS OF THE SKIN

PRURITUS (Itching) (code No 143)

Treatment

- A Specific Measures** Remember that localized (as well as generalized) pruritus may result from systemic causes
- Remove or treat specific causes whenever possible
- 1 Skin infestations (e.g. scabies, pinworms, pediculosis)
 - 2 Skin infections (e.g. fungal and bacterial infections)
 - 3 Skin inflammations (non infectious) (e.g. lichen planus, eczema, urticaria)
 - 4 Altered sweating (e.g. hyperhidrosis, anhidrosis)
 - 5 Allergic reactions (e.g. food, drug, clothing, serum, etc.)
 - 6 Senile dermatosis (e.g. senile skin atrophy)
 - 7 Metabolic disease (e.g. diabetes, hyperthyroidism, goiter)
 - 8 Uremia
 - 9 Jaundice
 - 10 Opiate intoxication (e.g. morphinism)
 - 11 Blood and neoplastic diseases (e.g. leukemia, lymphoma)
 - 12 Psychogenic factors (e.g. anxiety states)

B Local Measures

- 1 Shave lotion, emulsions and ointments incorporating the volatile analgesics and antipruritics listed in tables of pages 100 and 107 may be of value in relieving itching
- 2 Relieve excessive dryness or moistness of skin
 - a If skin is too dry, softening agents may afford relief e.g. ointment (R 31 page 103). An excellent principle for dry skin is to wet it in a bath (to hydrate the skin) then apply petroleum to the wet skin to trap the moisture
 - b If skin is too moist, drying agents may afford relief e.g. wet dressing (R 12 page 98-99), hake lotions (R 14-16 page 100) and powders (R 9-12 page 99) (especially if pruritus is acute)

Tar baths. Generalized pruritus may be effectively controlled by lukewarm baths 15 minute bid or tid. After bathing the skin should be blotted and rubbed.

 - (1) Star hand and soda bath 1-3 cups tar hand and 1 cup diatomaceous earth (Soda may be omitted)
 - (2) Tar baths Dil. 50-100 Coal Tar Solution U.S.P. in one tubful (50 gallons) of warm water (Watch for sensitivity)

CAUTION Avoid excessive drying of skin by overbathing, prolonged bathing periods and exposure to drafts after bathing

C General Measures

- 1 Diet
 - a Food should be simple. Avoid rich and spicy foods
 - b Test diets or elimination diets should be used in cases of suspected food allergies (see page 56)
- 2 Psychotherapy If pruritus is primarily a manifestation of an anxiety state, obsessive-compulsive or psychotic

ERYTHEMA NODOSUM (Due to Infection code No 114 1x0)

A tender nodular erythematous dermatosis occurring most commonly on the extensor surfaces of the legs and (less often) for arms. It is usually caused by toxins of infections and occasionally by drugs. The disease occurs most commonly in the spring or fall and usually runs a course of 2-6 weeks or longer.

Treatment

A General Measures

1. Eliminate or treat the specific cause.
Infections: Almost all infections (coccal, tuberculous, mycotic or viral) are capable of causing erythema nodosum. For treatment see specific diseases.
2. Exogenous toxins: e.g. drugs or chemicals.
3. Rest: Hospitalization may be advisable.
4. Focal infections: May be corrected although this does not appear to influence the course of the disease.

B Local Measures

Usually unnecessary, but if lesions are troublesome or complicated treat according to site and type of dermatitis (see pages 93-96-97).

- C. Tetracycline drug: 250 mg q.i.d. for several days have been shown to be effective in some cases (empirical data).
- D. Steroid therapy may be used if not contraindicated (tuberculosis must be ruled out). Gv. Repository Corticotropin (NID) U.S.P. 20-40 units I.M. daily or very thin layer of ointment two weeks or more of the corticosteroids (generally in large doses).

ERYTHEMA MULTIFORME

(Infection code No 11x 190) (Poison code No 11x 3x7)

An acute inflammatory polymorphic kind of multiple and sometimes serious. The disease is often a history of drug exposure or of a latent or acute infection. The skin lesions found most frequently on the distal ends of the hands and feet and on the face. The lesions are usually self-limited although they frequently recur.

Treatment

A Drug Measures

1. Eliminate causative factors.
Chronic yeast infections (e.g. tuberculosis)
b. Focal infection
Sedating drug
2. Fluid therapy: 1-150,000-300,000 units I.M. as indicated. The extent and duration of the illness when the drug is given is important (CAUTION).
3. Oxytetracycline: 250 mg q.i.d. for 1 day may be useful.
4. Corticosteroids may be used as for erythema nodosum.

B General Measures

Rest and good nursing are very important.

C Local Measures

Treat tag and type of dermatitis (see pages 93-96-97). The following principles should be observed:

III Contact Dermatitis

- B Use protective isolation in certain selected cases cautious re exposure may help to establish the irritant
- C Patch tests may be of value but false positive and false negative reactions may occur Dermatitis produced by such tests should resemble the clinical dermatitis In the event of a positive reaction a control test should be done on a normal individual

Treatment

A Definitive Measure

- 1 Prevent re exposure to irritant
 - a Avoid soaps and detergents
 - b Cosmetics Change to so called non allergic cosmetics or eliminate cosmetics entirelyOccupational irritants
 - (1) Protective rubber gloves may be used but are seldom indicated In such cases an inner cotton glove must be used
 - (2) Protective creams (barrier creams) may be tried but are of limited usefulness
 - (3) Change of occupation or duties to those not involving use of irritants may be necessary
- d Plant irritants (especially Rhus species e.g. poison ivy)
 - (1) Destruction of plants by manual removal or by chemical means (2,4-D or d-chlorophenoxyacetic acid) is recommended and necessary if frequented by people
 - (2) Avoidance of Rhus infested areas
- 2 Prompt and thorough removal of irritant by prolonged washing or by removal with solvent or other chemical agents may be effective if applied very shortly after exposure In the case of Rhus toxin thorough washing with soap and water must be done within a few minutes if it is to be of any value

B Local Measures Treat stage and type of dermatitis (See pages 98-97)

- 1 Acute weeping dermatitis
 - a Do not substitute with soap and water
 - b Apply soothing solutions (see table on page 98) If eczema becomes generalized use the soothing starch and barborat antipruritic bath mentioned on page 88Shakelotions (see 14-16 page 100) may be indicated instead of wet dressings or in interstices between wet dressings especially in intertriginous areas or when oozing is not marked Lesions on the extremities partially may be bandaged with wet dressings
- Hydrocortisone and fludrocortisone preparations (35 different preparations of hydrocortisone and fludrocortisone) lotions cream ointments pills and suppositories
- Use shake lotion
- Use hydrocortisone (sublingual) Use shake lotion
- 3 Chronic dermatitis (dry and lichenified) Treat with hydrocortisone or other corticosteroids Tars and phenols
- moisturizing lotions at the stage of the dermatitis
- C Geriatric Reproductive Contraceptive Pills U.S.P. (contraceptive pills) or on of the cortisone (see page 171)
- (CAUTION) and repeated daily (see page 171)

- 2 Cortisac in lotion cream or ointment for m appl d sparingly twi e d ily may be ery b lpfal (see page 424)
 - 3 Treat the clinical type and stage of the de mat tis
 - a Ac te we ping l sions Use solutions listed n table on p ge 98 as soothi g or act ing nt soaks baths or wet dressings in th d ytime for 30 minutes t i d or q i d Shake lotions (§ 14 15 page 100) m y be employ d at night o when w t dr sei gs are not de irable Les ons m ext em ties partic larly may b be daged f r p o t tion at night Powd rs (§ 9 11 12 pag 99) may be u d in ant trigu s ea when oo ing ill not m rk d
 - b Sub cut or a baiding lesions m y be tre ted with sh ke lot on which may incorporat mild antipru iti or mild stimulating g nts (a e page 107) Shake lotions re usu lly pref rred for wide m cad les on Ointm nts (see p ge 104) containing mild tar may b u d (a e table on page 106)
- Ch onic dry lich nif d l sions ar best tr ted with ointm nt cream a d p st s (see p ges 102 3) employ ng lub cat g keratolyt antipr rit c a d m ld k ra topl sti ag ts m ll ed the table o pag s 105 7
- Ind at d The t s a e perhaps the mo t popula th p tic gents in chron c e rma (2 3% o l tar in ointm ts c m and pa tes) Iod chlorhydro yqu n U S P (Vioform®) 3% o Chlo q l l dcl N N D (Ste ona ®) o lme to cr am m y be ed i h ya as o f the a dio yn say t r
- 4 X ay th apy (by spe ial st) may be sed effe ti ely if only t mpo rily n many stages

DERMATITIS MEDICAMENTOSA (Drug Rash) (code No 110 3)

An ut or hro i inflammatory kin eact on whi h caused by a wid r ty of dr g and which cau s wid variety of skin l ons in su ceptibl ind vid ill The rea ti n m y be imm dist o d l y d (to f w w ks) and may or may n t be a ocl t d w th co stit tional d sturban e (f ve b ada be etc) Improvement following withd awal and limination of the sp ct d d ug usually take a few d y b i may t ke lo ger A rule it is not drisabl to it mpt di gno tic pro cation o an e e b t n by re xp sur to th drug Skin t ste are ld m of any value

T ime t

A Sp ilic M s u e

- 1 Stop all d g if po ssible
- 2 Ha ten elimi ation f drug by m re s ug fluid intake
- 3 Giv sp cifi d to ifyng ag nt

Dim r pr i U S P (BAL®) m y b t i d in s ll to B vy m tals (a e nic m r tury gold ■) (see p g 536) Ed thamil C l l um D d um N N D (Ve nat ®) m y be worth try g f r lead p iso g (a e p g 541)

- B Sod m chl r de 5 10 Gm (75 150 g) d ly o lly may ha t n elim nat n of bromid s and i d de an e d to th d ug (see ges 538 d 540)

- 1 Acute lesions Employ simple wet dressings and soaks or soothing lotions For treatment of buccal lesions see page 261
- 2 Subacute lesions Soothing lotions

Prophylaxis

Avoid all unnecessary medication in susceptible individuals
 1. Patients with a previous history of erythema multiforme

ECZEMA (code No 111.390)(and Eczematoid Dermatitis)

A large group of non specific acute or chronic superficial inflammatory skin reactions which occur as a result of exposure to chemical physical or unknown irritants or as a result of allergens. Irritants may be external (e.g. contact dermatitis) or internal (e.g. dermatitis medicamentosa). There may be a history of allergic tendencies (atopic eczema) and blood eosinophilia may be found. The term eczematoid dermatitis is used for eczema like reactions of undetermined origin. The lesions feature a usually pruritic acute lesion a usually erythematous vesicular or exudative. Chronic lesions are usually thickened squamative or lichenified.

Treatment

A Specific Measures

- 1 Elimination of inciting agents (see above) is in essence the only specific measure. A preliminary trial and error elimination and exposure technique may be of value in incriminating possible offending agents. Skin tests are often valueless. Desensitization is of no value. Sensitivities are usually multiple.
- 2 Diet Should be adequate and well balanced. There is no evidence to suggest that standardized or routine dietary restrictions are of value especially in adults. Tests diets or elimination diets may be of value in determining food allergens in individuals when an urticarial component is present. Food diaries may be kept by patients with chronic eczema to determine possibility of food allergy. Reported common food offenders are wheat milk eggs pork fish shellfish tomatoes strawberries and chocolate.
- 3 Psychotherapy An attempt may be made to determine and correct existing emotional disturbances but this is of no practical value.
- 4 Remove definite foci of infection but a old routine polysurgery.

B General Measures Corticosteroids (ACTH) or the equivalent may provide symptomatic improvement in severe or fulminant eczema (see page 424).

C Local Treatment

- 1 Avoid all unnecessary local irritations to the skin such as may occur from excessive bathing, or as a result of exposure to irritating drugs chemicals greases and oils. Soapless detergents are not advisable. Clear up skin infections promptly (particularly those with pus) by appropriate measures (see pages 64-65).

- 4 Topic 1 ti infecti e drugs [g 1% squ s n omyc
o yt tr cy li e hl tetra y line hloramphe i ol
(CAUTION) ythromycin o polymyxin B o iments]
ho ld be us d when n e sary (see p ges 84 86 a d 107)

P ophyla

P r i r c i i g a n t i g drug should be w tch d e
f lly f r th de elopme t of kin actio of all types Th drug
sho ld be w thheld u til th tur f the sk re t i n determin d
Def t een it atio m y b o s d e d a absol t contraind
t n to f ther d g adm strat o

DERMATITIS ACTINICA (code No 110-451) (Erythema Solare or Sunburn)

A act i flamm to y skin e cti n following pos to s la
th ultra oiet r diatio It m y v ry from s mple erythem
to e x f l i a t o n and may be s s o c t e d with sy tem ma fes
t t i o Som i d d l s ab s m lly light e t i v

T m i

- A Symptom H M Tr t onst t t al symptms by
pp p at ppo t i e m ur Co trol p l bur g f er
d g t o i t i l d th symptom s they
B Lo l M Tr t a s f ny ut de m t t (see p g
83) F at col g d sooth g wet d s s i g s (s pag 88)
d foll w with l t o (s pag 100) Gr es m at b s ded
b e of th l r o c l u s i e ffect
C F r polym pho s a d other light it ly rupt o s Chlor
q Pho ph t U S P 0 25 Gm (3 3/4 g) b i d now
appea t be the t e tment of hosc F s v r e r l
t ant as es Cho o Go adot op N N D 500 It I M
daily o Gold Sodium Thio ulphate N F 50 mg (3/4 gr)
I V o c e weekly (CAUTION) may be t e d

P ophyl

- A I d d l w th v y b l d s n sk sho ld o d s t o g
d p o l o g d pos to the su o ultr l t d t o n P
l m i s y o d t i o g b y g a d d p s m d i b l
B P o t i Ag t Apply to ki b f pou e t d t i o n
1 P am ob zo Ac d N F 10% i hyd phul ointme t
2 C bolat d (phen l i z d) V lin s a good s n
3 Menthyl s thra ilat (5%) a d 5 f t t ium d o de e m
4 D g lloyl t r i l e a t cr m (N o A fl r)

ICHEN BLANUS (code No 110 865)

A h o r u i flammato y ki d s e of kn w e ha
ct d by s m l flat topp d i l o p t p p l whch
s angula in h p e (u lly q d l t l) a d o f v a y g s e
th y commo ly n the fl o u f c of th fo m a d
th gh o the l w p t of th b c k and n the g nital
Th e m y b as o c i d b l l s s R i d l p g m e t a t n a d
t ophy m y o c u but s lly the e a c qu l L h
plan m y b im i t d by d g u p t o n (b a m th q m i r

7 Exfoliative Dermatitis

B General Measures

- 1 Discontinue all unnecessary medication when feasible for as long a period as possible
- 2 Treat systemic manifestations as they arise e.g. anemia, icterus purpur etc
- 3 Antihistaminics may be of value in reactions of urticarial and angioneurotic character (see page 56)

C Local Measures Treat the varieties and stages of dermatitis according to the major dermatitis which is simulated

- 1 Eczematoid (see page 70)
- 2 Acneiform (see page 77)
- 3 Puritic (see page 68)
- 4 Pyoderma (see page 84)
- 5 Urticarial (see page 78)
- 6 Bullous (see page 86)
- 7 Lichenoid (see page 73)
- 8 Exfoliative (see below)

EXFOLIATIVE DERMATITIS (code No 110 966)

A serious cutaneous reaction often due to sensitization to certain drug (e.g. arsenic and gold) and also commonly caused by lymphoblastoma. It is characterized by itching weeping erythematous patches which rapidly coalesce and spread to become generalized. Finally a desquamation or exfoliation of large areas of skin occurs. There is an associated severe constitutional reaction with fever and other systemic symptoms. The disease runs a course of weeks to months and is attended with a high mortality rate.

Treatment This is a medical emergency

A Specific Measures

- 1 Stop all drug if possible
- 2 Hasten elimination of offending drug by all means e.g. by inducing fluid intake
- 3 Diminution of U.S.P. (BAL®) may lessen the severity or duration of reaction due to arsenic or gold (see page 536)
- 4 Corticotropin (ACTH) U.S.P. 20-40 units I.V. or Cortisone A.T.A. U.S.P. 50-100 mg I.V. orally if indicated

B General Measures

- 1 Hospitalize patient when possible. Use talc or bed sheets
- 2 Keep room warm and temperature at a comfortable level
- 3 Institute supportive treatment as follows: plasma
- 4 Avoid all unnecessary medication
- 5 Corticotropin (ACTH) or cortisone may produce symptomatic improvement in the more or less imminent exfoliative dermatitis (see page 424)
- 6 Secondary infections. Penicillin or other antibiotic drugs should be given when there is evidence of bacterial infection (see pages 84-88 for dosage schedule). Pyoderma is the most severe complication of exfoliative dermatitis

C Local Measures

- 1 Observe careful hygiene
- 2 Avoid irritating local applications
- 3 Treat skin as for acute extensive dermatitis
 - a First Wet dressings cool soothing baths (see page 58) powders (see page 88) and make lotions (see page 100)
 - b Later Soothing oily lotions (see page 100) and ointments (see pages 102-103)

- 4 Topical antifungal drugs [eg 1% aqueous nystatin
oxytetracycline chlortetracycline chlortetracycline
(CAUTION) erythromycin or polymyxin B ointment]
should be used when necessary (see pgs 84 and 107)

Phyl

Phyl treatment should be withheld completely if the development of skin reaction of all types. The drug should be withheld until the state of the skin reaction is determined. Definiteness of reaction may be decided on absolute contraindication to further drug administration.

DERMATITIS ACTINICA (code No 110-451) (Erythema Solare or Sunburn)

A acute inflammatory skin condition following exposure to a large amount of ultraviolet radiation. It may vary from simple erythema to a severe exfoliation and may be associated with systemic manifestations. Some individuals are abnormally light sensitive.

Treatment

- A Symptomatic treatment. Treatment of symptoms by appropriate symptomatic relief. Corticosteroids in buccal gelatinous ointment with the symptom ethyl alcohol.
- B Local treatment. Treatment of the skin (see pgs 93-94). For cooling and soothing with cold water (see pgs 98-99) and follow with lotions (see pgs 100-101). Cold cream should be used on the face.
- C For polymorphous dermatitis. Light therapy. Chloroquine phosphate USP 0.25 Gm (3 3/4 g) bid now appropriate treatment of haemorrhage. For severe local lesions. Chloroquine phosphate NND 500 mg bid daily or Gold Sodium Thio sulphate NF 50 mg (3/4 g) bid IV once weekly (CAUTION) may be used.

Phyl

- A All individuals with erythema should avoid exposure to the sun or ultraviolet radiation. Limitation of exposure by appropriate measures is desirable.
- B Phototherapy. Apply treatment before exposure to radiation.
- 1 For treatment of Acid NF 10% hydrophilic ointment.
 - 2 Chloroquine (phenolated) Valium 10 mg qid.
 - 3 Methylthioacetate (5%) and 5% thioacetate in dioctyl sebacate.
 - 4 D-glucose in 5% solution (N o A f 10).

LICHEN PLANUS (code No 110-965)

A Chronic inflammatory skin disease of unknown cause. It is characterized by small flat topped violaceous papules which are angulated (usually quadrilateral) and of varying size. They commonly occur on the wrists, forearms and in the thigh. On the lower part of the back and the genital area. The reaction is so it is called a red lichenization and the primary but slowly the reaction is a lichen. The lesions may be simulated by drug reaction (benzothiazine).

74 Psoriasis

Treatment

A General Measures

- 1 Phenobarbital U S P II 30 mg ($\frac{1}{4}$ $\frac{1}{2}$ g) b i d q i d
- 2 Psychotherapy Patients are often high str ng or tense and nervous Episodes of dermatitis may follow emotion l crises Measures sho III be directed at relieving anxiety
- 3 Chloroqui e Phosphate U S P II 25 Gm ($3\frac{3}{4}$ g) b i d orally for o e month is worthy of trial If chlo equine is not tolerated hydroxychloroquine sulfate (Plaquenil®) II 2 Gm (3 gr) b i d orally may be t i d

B Local Measures

- 1 Use shake lotion containing tar (§ 17 page 100)
- 2 X ray may be used only in severe c s which hav pro ed refractory to other fo ms of treatment Treatment by x ray must b reserv d for the speci list

PSORIASIS (code No 111 961)

An acute or chronic inflammatory skin d sease of g neti ti ology whi h s characterized by m cular and pap lo q amou lesions of varying sizes and configu tion (u ally w th well defined bord rs) The lesi n have dry silv ry scales and bl eding oc rs when these ales are rem d Pru itus i rar except n flexu s s or in acute eruptiv s The lesions occur on the ext nsor su faces of th extremities and on the trunk nails and s lp There III sometim s an associ t d dis bling rthritis but s const itutional f ctors Stippling of th ns ls may be pathognomonic

Treatment

A General Measures

- 1 Clim te Warm lum tes se m to exert favor ble effect
- 2 Nonsp cific intern l medic tion s of l ttl value w th the ex ption of ar ic which is haz rdo n tew of th r t at re of th lesi ons d th d ly d effe t of ex ce iv s of a sen (k rato s g th lom)
- a Cyanocobalamin U S P (Vitamin B₁₂) 1000 mcg I M 2 3 t mes a we k is said to be of l
- b A s n c F wle sol ti n (P ta um Arsenite Soluti n N F) h b n e omme ded n dos s of 3 15 d ops tw ce d ly in p tents w th suba ut or hro l lesio s Dos g dur tion f adm n i tr tion indication nd eve ad bility of th dr gare o t ov sial It may b g ve n rep ted co r s f i d t d b tea h o s should t be ont d l ge tha 3 3 mo th (see page 239)
- 3 Psychoth rpy Re su ance is imp rtant since thes p tie ts are apt to b di cou ged d e to chronicity of the dise se An att mpt sho ld be made t r ll ve ex ting an iet es

B Local Measures

- 1 Acute psori s (Avo d i r i t i ng or stim l i g drugs)
 - a Begin with a shake lotion (§ 14 15 pag 100) or bl d intrn ts (ee page 102) containi g 5% dete g nt sol t on of coal tar
- B As lesi ons be ome l ss a ut

mil

ke at pla t c ag nt (s e e p g 106) to lotions (see pag 100) and hyd oph l ointm nt (ee page 103) W tch p t t ar f lly

2 S ba tep o las

a G ve wa m baths da ly ac b b ng the ski lesions tho ghly with b ush o p a d wat r

■ Apply crea g o centratio s of k r topl tie or ■ mu lating gents (e p ges 106 a d 107) i m po at d in l tlo s (ee page 100) a d hyd phili ointme ts (ee page 103)

Sol r o ultr iolet i r d ations m y be ppl d ing d ally in si g dos

3 Chro psorias s

Amm iated Mer v y Ointment U S P (57) l cally b i d

u A th al ■ P 1/47 ointment lo ally o c a day (d y)

■ Comb dult avi let i r d at on d t r g men (m d fied f m G kerm) (Daily n ed d) Smear 2 57 lta ointm t (s p g 71) th kly on ki d l e f 12 24 h u s Wip off o int nt with miner l il l av g lght i l Foll w with da ly gr d d s b r yth m do es f ltr let lght as t l ted

PITYRIASIS ROSEA (code No 111 962)

A s mmon mild ac t inflamrsto y skin d s see of unk n wn t l lgy wh h is h a te l ed by p m lo quamo erupt n on the trunk m s d th ghs and wh h o cure m r f equ ntly in th p ing and f l l The pap le are pink and oval w th ac ling bo d and p l s te th y s e typically a ang d w th th i lo g al g th le v g lines f the ki A ungl h rald p th m y p ec d multipl l son by a p e i d of sev l d y The l sion may or m y not be p urit The d seas usually l te 6 we k w th without tr tm t

T sim t

A G l M = None

B l os l M

- 1 Acute st t d le i s a uncommon Hp es nt tre t a f r a te derm tit with wet d eal gs (ee p ges 98 And 99) o w th h k l tion (R 14 17 pag 100 101)
- 2 Cal Tar Sol ion U S P 57 nst ch lot b i d
- 3 Ultr iolet light is h lpf l
- 4 Pru it s S lo l slp lti meas r on pag 86

SEBORRHEIC DERMATITIS (code No 111 190)

An a ut ch o ic p pul q mo d m titus sten as ocl t d w th c siv o lin of th kin and co ing in th so c l l d b o a as f the b dy g alp midportil of f at nal gion and int m p l region) Th le to ppe (1) a y il w sh gr ay les o (2) an ut or h o i e m toud rmatitis in e s of acba ou gland c c t ■ and in intert igitou r a e tly a p ur ti

76 External Otitis

Treatment

A General Measures

- 1 Diet Well balanced adequate diet avoiding excess sweets spices hot drinks and alcoholic beverages
- 2 Regular working hours recreation and sleep
- 3 Simple cleanliness
- 4 Remove aggravating systemic factors (infectious overwork emotional stress constipation and dietary abnormalities)

B Local Measures Treat type and stage of dermatitis

- 1 Acute subacute or chronic eczematous lesions Treat generally as for dermatitis or eczema (see page 6)
- 2 Seborrhea of scalp
 - a Selsur® suspension (selenium sulfide) following weekly shampoo Foates® cream (containing soapless cleansers wetting agents hexachlorophene salicylic acid) may be used as a weekly shampoo for oily seborrhea
 - b Sebizon® lotion (sodium sulfacetamide) once daily
 - c Mild cal tar scalp lotion (§ 21 page 101) may be used
- 3 Seborrhea of non hairy areas Mild stimulating lotions (§ 17 page 100 or 20 page 101) may be used Ointment (§ 36 page 104) or 3-5% sulfur in hydrophilic ointment (see page 103) may be used (The addition of 1% salicylic acid aids in removing scales)
- 4 Seborrhea of intertriginous areas Avoid greasy ointments Astringent wet dressings (§ 18 page 98) followed by 5% ammoniated mercury in hydrophilic ointment (see page 103) may be used

EXTERNAL OTITIS (code No x75 100)

This may be considered a variant of seborrheal dermatitis and at times may become an infectious eczematoid dermatitis. An interference with ceruminous secretion leads to inflammation of the canal wall and predisposition to secondary bacterial infection usually with *Pseudomonas aeruginosa* (Bacillus pyocyaneus). Fungi are rarely if ever causative.

Treatment

A General Measures

- 1 Penicillin 300,000 units once or twice daily (IM for accompanying fever and erysipelatoous changes) (CAUTION)
- 2 Phenobarbital U.S.P. 15-30 mg (1/4-1/2 g) b.i.d. q.i.d.

B Local Measures

- 1 Aqueous lesions Cool wet dressings
- 2 To remove cellular debris if present Give erlenmeyer flask with carbamide soap drops b.i.d.
- 3 Iodochlorhydroxyquin U.S.P. (Nioform®) 3% cream b.i.d.
- 4 Hydrocortisone Acetate Ointment U.S.P. 1-12% locally
- 5 X-ray therapy in refractory cases (must be given only by a trained specialist)
- 6 Polymyxin B-bacitracin ointment (Polysporin®) oxytetracycline chlortetracycline neomycin or erythromycin ointments (see page 514)
- 7 Corisporin® otic suspension (hydrocortisone neomycin polymyxin B) may be beneficial when res fail

ACNE VULGARIS (code No 151 7x0)

A mmo infl mmato y kind se of gen ti origin p o
voked by androg s in the mal and p ogest e in the f mal It
ally f und an dol nts with pl morphic l sion (pu tul
bla khe ds whiteh ds nla g dpores ysts and ac ring) l c l
d typ lly on the fa n k che t hs k and hould

T eatm t

- A 1 Meas El minat all umm e ry m dicat n
pec ally bromid or odides
- 1 Det Sh uld b deq t and w ll balan ed Avo d exc s
of behy d tes hocol te nut fatty o f d food al
coh l bev r ges and sp y food
 - 2 A id o p t on l expos e to mna ral oils and g ses
 - 3 Et gen m yb tr d in w m n Thy ho ld b topp d
for o w k (pr m st ually) ch month
Diethyl tilb trol U S P enter coat d tabl t 0 5
to 1 0 mg (1/120 1/60 g) daly by m th
b Est g ic S bsta es C j g t d N N D (P m)
1 2 mg (1/60 g) d ly o
Pip Est e S H t N N D (S lest ex^b) 1 5
mg (1/40 g) d ly
d Eth nyl Estr d ol U S P 0 01 0 05 mg /c in 70^y
ethyl al h l r bbed nto sk b d m yb h lpl l
 - 4 W t m bl Vitam n A U S P 100 000 t ally
ea h d y for 3 months m yb tr d b t has l mlt d valu
 - 5 r t y l m c d g me t l d g tion nat p tio
m l trit f ti a m dem t l d turb c a
 - 6 V Aut ge o a d ato kv ies d ther f reign
pot n i g sh e ben mploy d with qui o l r lt
 - 7 T t cycl e U S P 250 mg d ly s y th day fo
w ks o mo the v y helpf lf ome e fa e
- B L l M ce

- 1 Local lean ing of sk n and calp
a O d y so pf leans g
b A id g easy la g r me doth r m ti a
c Shampoo alp l 2 t me w k (R 48 p g 105)
- 2 E tr tio and d un ge f lo al les o s in el t d ca s
a Ext ct bl ckne d with om do xtr t r afte oft ning
f e with h t w ter compr s fo 1/2 l ho r
b In and d infl ctuant y tic lesi ds with small sh rp
lp l H t mp s 1/2 hou t id f vor d ing
- 3 K t pl st dk t lytic ag nt
a Hot wat m m ric a l d c mp s s (not teaming) m y
b us d to p od hype mi and desq am t on of l i n
c K ratolyt lot ons A ne l tion (s H m lotio) (R 19
p g 101) o all inoll tion (R 20 p g 101)
may b tr d th y a appli d lot lly to the kin t bed
time a d wa h d off i th m ni g
c Kerat lyt intm t and p t B gun with w k p epa
t ons and bu ld up as t lerated Apply t b d tim and

remove in the morning

(1) Sulfur 2-10% in hydrophilic ointment (see page 103)

(2) Sulfur and kaolin paste (p. 39 page 104)

(3) Quinolol® ointment or Vioform® ointment (see page 107)

4 Irradiation

- a Simple exposure to sunlight in graded doses is often beneficial
- b Ultraviolet ray May be used as an adjunct to other treatment or to remove scars. Use suberythemal doses in graded intervals up to point of mild erythema and scaling
- c X rays This is very effective technique should be reserved for only the more severe cases and only after other more conservative measures fail. X-ray therapy must be reserved for the specialist

URTICARIA (Hives) (code No 11x 390) and ANGIONEUROTIC EDEMA (Giant Hives) (code No 11x 580)

An acute or chronic inflammatory skin reaction of allergic origin manifested by multiple markedly pruritic wheal reactions of varying sizes with no characteristic localization and at times involving the mucous membranes. Acute attacks are usually self-limited from a few minutes to a few weeks but have a tendency to recur. In extreme cases a laryngeal edema may cause a respiratory obstruction and death. Skin infections, contact dermatitis, toxic erythemas, etc. may be other causes of urticarial reactions.

Treatment

A General Measures

- 1 Purgation Initial purgation to remove possible antigenic material has been recommended in acute cases. Castor Oil U.S.P. 15-30 cc (1/2 to 1 oz) may be given. Stool may be examined for parasites.
- 2 Diet During the acute phase the diet should be simple and free of substances common offenders as wheat, milk, eggs, pork, fish, shellfish, tomatoes, strawberries, and chocolate. Past history of food allergies trial diets and elimination diets may be helpful in determining the offending food. The patient should maintain a record of diet and symptoms. It is also desirable to know food offenders.
- 3 Avoid use of sympathomimetic. Suspect lidocaine (even epinephrine, ephedrine, thistamine, etc.)
- 4 Drug
 - a Antihistaminic drugs often give prompt and sustained symptomatic relief. If penicillin which is being given as a lifesaving measure produces an urticarial reaction it is sometimes possible to continue the drug by simultaneous administration of an antihistaminic drug. This must only be done with great care. Examples of commonly used antihistaminic drugs are given on page 45.
 - b Epinephrine Injection U.S.P. 0.3-1.0 (3-15 cc) of 1:1,000 solution but for telangiectases which (1) Laryngeal edema is a contraindication.

() U t c ia i int se

(3) A t h a m i drugs ha e fall d to g ve ei f
c Ephedrine S lfate U S 25 mg ($\frac{3}{8}$ gr) or lly q i d
d Ephedr e edati e m t r fo th py o pr phylax
(o e cap ul q i d)

(1) Ephedrine Sulfate U S P 25 mg ($\frac{3}{8}$ gr) and
nlob rbit l Sod m U S P 25 mg ($\frac{3}{8}$ g)

() Ephedrine S lfate U S P 25 mg ($\frac{3}{8}$ gr) and
Phe barbital U S P 15 mg ($\frac{1}{4}$ gr)

5 Co tic tropin (ACTH) or the co tiso es m y p ovide spec
t i n improvem nt se re o f l m i n a t a n g i o n r o t c
edem (see page 423) These drugs should be only if
it is appar t h t h pat t will n t respo d to mo e con
s at ve m s s

6 Misc li co s meas r e ha b n r omme d d for th
hro fo m of the d sea e b t their valu is qu tio ed
a Dil t d Hyd ochlo Ac d N F 15 20 d ps t i d
a and d ung m ls Br sh t eth aft r me ls with
od m b arbo ale

■ C lei m Gluconate U S P 1 Gm (15 gr) t i d
orally p c Oth cal ium alts may also b us d

■ Lo al Meas e Antipr li s a freq uently of b n fit

1 Soothing tip ur t c b ths (see p g 66)

2 Soothi g a tip tic lotio (see page 100)

Prophyl is

A Elim t d vo d e po u to ca t ve f cto

1 Se t g d g Almo t alld g are apabl of produc
i g a n t i a l r a t o Op t b r b i t u r t e s a l l y l
t s p i l l s u l f o m d e s b r o m i d o d d a t i
h i t a m c c o t i c o p i n (ACTH) t

2 Se t i z i n g f o o d A y f o o d m a y p r d u c e a u r t c a i a l e
p o s e s c e p t i b l i d i v d a l s a n d s h o u l d b e c o n s d r d i n
o b c u e s (p t i l r l y h c c a e s) f u t o

3 Agg a t i g p h y i i f t o g s e h e a t a n d o l d
k i n a n d m u c o s m e m b i r t i s

4 Agg a v a t i n g s y s t e m i f c t o s g c h r o n i i n f e c t i o n s f o i
o f i f c t o n s p i t i i f e t t i o a d b l o o d y r a s

B R l i f f P y c h i D i r b e i u s c a b l e d i v i d u a l
m o t o a l t e a d t m a y p r p t a t t h i i o n s

INTERTRIGO (code No 111 437)

E y t h e m d e t o c h f i g o f t h s k i n

T t m e t

T e t s t i n a c r u r i s (see p g e 89) b u t d o o t e f g i d l
g e t

MILIARIA (Heat Rash) (code No 153-445)

An acute dermatitis characterized by small erythematous burning and often pruritic papules, vesicles and pustules which occur most commonly on the upper extremities, trunk and intertriginous areas. It is caused by exposure to a hot moist environment.

Treatment

A General Measures

- 1 Provide optimal working conditions when possible: i.e. controlled temperature, ventilation and humidity.
- 2 Avoid overbathing and use of strong irritating soaps.

B Local Measures

- 1 Antipruritic cooling lotion apply b i d to q i d

R Menthol	1 0	gr xv
Phenol	2 0	ss
Glycerin	15 0	3 v
Alcohol 35% q a ad	240 0	3 viii
- 2 Drying astringent lotion (R 14 with 1% phenol or R 15 page 100)
- 3 Sulfur resorcinol lotion (for seborrheic skin) (R 20 page 101)
- 4 Antipruritic powders or other dusting powders (see page 99)
- 5 Treat secondary infection (pyoderma superficial) with potassium permanganate soaks, compresses or baths (see page 98). Ammoniated mercury 2.5% in a hydrophilic ointment (see page 103) may be employed if necessary.
- 6 Tannic Acid N.F. 10% in 70% alcohol locally b i d.

Prophylaxis

- A. Trough skin. Good exposure (covered daily) to sunlight or ultraviolet light may be effective individually when well tolerated but not in hot moist atmosphere.
- B. Avoid exposure to adverse atmospheric conditions especially in crowded and dual.

ANO GENITAL PRURITUS

(Ani code No 143 573) (Vulvae code No 771 570)

Diagnosis

- A. Consider the role of systemic causes of pruritus, anxiety states, diabetes, ichthyomycosis infection and intertrigo.
- B. Rule out all obvious local pathological conditions of the anus and rectum, bowel irregularities, colitis, etc.

Treatment (See also Pruritus page 66)

A General Measures

- 1 Diet: Avoid hot spicy foods (e.g. hot peppery, chili) and drugs which are irritant to the anal mucosa.
- 2 Treatment: tip of the penis (see page 254)
- 3 Provide necessary psychological treatment as indicated.
- 4 Instill the patient to use very soft or moistened tissue or cloth after a bowel movement and to clean thoroughly. Women should apply anesthetic ointment after insertion.
- 5 Instill the patient regular bathing and pruritus and itching effects of scratching.

Lo i M u es

- 1 Phenol ted Cal mt e Lot on U S P ppl d locally
- 2 S t b ths b i d if the a s i s ut ly i flam d d oo i g
us g S l v N t at U S P 1 10 000 1 200 (0 01 0 57)
Pot lum P manga ate U S 1 10 000 (0 017) o
Al m n m Sub cetate Sol t n U S P 1 # (5%)
- 3 U der l th g h l d b cha g d daly
- 4 C t o l x s s p r s p r t n by u e of d ying p wd s such
as talc (s page 99)
- 5 Pal t f s u d o r u l t d as w th S l v N t ate U S P
107
- 6 Hydroco t one A et te O r t m nt U S P 1 2 1/2% locally
d
- 7 X r y ther py may b us d if oth m ures f il This
sh uld b rese ed f r the sp ial t

P ophy laxis

- A T s t all p ssibl yst mic or local use
Instru t th p tie t m prop ano gent l hyg ne

**CALLOSITIES (code No 112-430) and
CORN (of feet or toes code No 148-433)**

Tr t m t

- A Corn (m ch nst i b m p p g wht n or frict and e
ult in th ho y ov growths
- 1 Sho s mu t b prop ly f tted
 - 2 O thop dic d f mlt must be tr ted and co rect d
- B mov C ll it By
- 1 P ing of ll aft warm w te #
 - 2 Ke t lyst by us of h m lag nts

a R S licyl c e id	4 0 3
A ton	4 0 3
Collod on q s ad	15 0 3

g Apply l lly to alu v ry night and o e w th a
t ip of adh si R mo adh siv in th m ung Re
pe t unt l corn or ll u i moved

Comm cial sal y h acid c npl st may b s d
 - 3 A metat r l i e ther bar l p i h w d and 1/4 in h high may
b pl ed on th out ide of th hoe j t b hind the w lght
b aring u f e of th sol

DRY SKIN (Congenital Senile or Environmental)Tr tmentA G l l str ti to P tie t

- 1 Avo d ex esse ve b thing and u no oop Avo id undu g y
ing i r tating o k t lytic med ament avo id old o
d g e vironm nt
- # Apply m pl g s i h lly to the kin whil it i wet
co on t butt eg t bl cooki g fats Hyd ou Wool Fat
U S P (la h) L qu d P s olatum U S P (m al y l)
P trol t m U S P or impl oi m ts (p g 102 103)

III Herpes

- 3 Soapless detergents may be used when bathing but they may do more harm than good

B General Measures

- 1 Treat complicating dermatoses (e.g. scalp eczema and pyoderma) by appropriate measures (see pages 71 and 88)
- 2 Vitamin A in high doses (50 000-100 000 units daily) has been recommended but results are questionable

HERPES SIMPLEX (Cold or Fever Sore) (code No 13 166)

An acute viral infection apparently precipitated by various causes such as fever infection allergy ultraviolet radiation and psychic trauma. The small grouped vesicles can occur anywhere but are most frequent on the skin and mucous membranes of the face nose mouth throat and genitalia. Regional lymph nodes may be involved. Attacks are usually self limited but are often recurrent.

Treatment

For persistent or severe recurrent herpes

A General Treatment

- 1 Eliminate precipitating agents when possible
- 2 Routine smallpox vaccination twice yearly intervals for 8-8 weeks. Equivocal results

B Local Measures

- 1 Dust vesicles twice daily with bismuth formic oxide (BF) powder or use
Shake lotions (R 14 15 page 100)
■ Camphor Spirit N.F.
■ Benzoin Tincture U.S.P. (R 47 page 103)
- 2 One of the corticosteroids in ointment form 1-2 1/2% locally applied may be of value. The mainstay not be used for dendritic keratitis
- 3 Chlorotetracycline U.S.P. (Aureomycin®) 0.5% locally as eye drops may be of value in patients with dendritic keratitis
- 4 If there is associated cellulitis and lymphadenitis apply cool compresses
- 5 Treat stomatitis as outlined on page 261
- 6 Use x-ray therapy in selected cases. This requires administration by expert personnel

HERPES ZOSTER (Shingles) (code No 13 167)

An acute vesicular dermatitis of viral origin which has a characteristic distribution corresponding to involved peripheral nerves and is associated with various local nervous symptoms (neuralgia pruritus burning and a tonic sensory-motor disturbances). The intercostal nerves of the sensory root of the extremities and the ophthalmic nerves are most commonly (individually and unilaterally) involved but the posterior ganglia are involved (resembling chicken pox). The condition is usually self limited and nonrecurrent although at times a persistent neuralgia may

ema n The d ea m y b p r e e p t i t d b y r m y b e a m n i f e s
t i o n o f c h f t i o n s l o c a l t r a u m a h e a v y m e t l p o i s o n i n g
o l y m p h o b l i o m s

T e m tA G n l M e s

- 1 S d a t ■ b i t r a t e o r h o m i d e s m a y h e l p c o n t o l t
i o n d e r v o u s e s s o c i e t e d w t h n r ■
- 2 A a l g i c A e t y l s l i c y l i c A d U S P (s p i r) 0 6 5
G m (1 0 g r) o r a s p i s m p u n d w t h o r w i t h o t C o d i n e
P h a s p h t e U S P 3 0 m g (1 / 2 g r) u s 1 / r o t o l p a r n
- 3 A t h e m o t h r a p r 1 0 c o f t h p a t e t s v o u s b l o o d i s
j e c t d i t a g l t e l l y e v y o t h e r d a y f o 3 i j e t i o n s
- 4 O p h t h a l m l o g i a l o n i t a t i o n s h o l d b c o n s d e d f s u
■ s o b i t a l i v o l e m e t t o a o i d s r o e u l a c o m p l i a t i o

B L o c l M e s

- 1 W i d s a g m y b e c s a y f o a u t a n d e x t s i v
i f l i m m a t o r y l s s (e e p g e 9 8 9 9)
- 2 C a l m i n l o t o r t h s h k e l o t i o n s (s e p a g 1 0 0) a
o f t e n f a l e A p p l y l o t n l i b r a l l y s d c o v e r w i t h a p r o
t e t l a y e o f c t i o b t i l g A v o i d g r e e s
- 3 X r a y t h a p p g v n b y x p r t m y b h l p f u l
- 4 R e p o l t r y C o t c o t p i n i j e t i o U S P (c o t i c o t r o p i n
g l) 4 0 8 0 u i l M d a i l y f o 3 d y s m y l v t h e p i n

LUPUS ERYTHEMATOSUS (cod No 11019)

D e

A a t r h o o i c d m t i o f k n w o l g n m n f a t d b y
t w o m n e i n t l t y p s

A D i o d T y p M l d l c a l h o p l o o s a d
■ k { b t i f l y p t i t e r } w i t h o o s t i t a l s y m p t m s

■ D i s m i t e d T y p A s e o u s s y s t e m d i s a w h a t o r e
t a d h o n f m w t h w t h o t d s o d s k j e
n a s d s s o c a t e d w t h l v e r w e k s m i a n d v
d e n o f d i f f s l a r l s o s c h s e d c a r d i t l t h
i a n d p h r i s (S p g e 5 1 9 f o r d g n i d i t i m n t
f i b d e m i d t y p e)

T a l m tA G a l M s e

- 1 P f o m r e p l e t t o e d c a l a t d y t o r u l e o t y e t m i n i p u
y t h m t o s s
a E a m i f o c h o n i n f e c t n
b D e t m i n d e i a n d j o t i s t
- 2 P v i d p t e t i n f o m s l i g h t a n d a l l o t h e p o w f u l
d i t i n D o n t u s e o n l y f r m f r a d i a t i o n t h e r a p y
- 3 M i t i o p t m a l g a l h e a l t h b y w l l b a l a n c d d i w t h
p p l e m t y t m i d r o n a d i t d i u r d
q i t d p r c r b b d a t w h t h p a l t i f b i l
- 4 N o s p e f t h p y f o r d i a c i d t y p e o n l y
Q u i H y d o h l o d U S P (A t a b i n ®) 0 3 G m
(5 g r) a l l y d i l y f 2 w k s t h 0 1 G m (1 1 / 2 g)
d i l y f 3 m o t h o m
b C h l o q P h o p h i U S P ■ 5 G m (7 1 / 2 g r) d i l y

II Skin Infections

for 1 week then 0.25 Gm ($3\frac{3}{4}$ gr) daily watch for signs of toxicity with both of these drugs

- c Hydroxychloroquine sulfate (Plaquenil®) 0.2 Gm (3 gr)
b i d orally may occasionally be effective when quinine and chloroquine are not tolerated

- B Local Measures Treat the existing stage of dermatitis by appropriate measures (see pages 83 and 96-97)

INFECTIONS OF THE SKIN

ACUTE SUPERFICIAL INFECTIONS

The acute superficial infections include the following

- 1 Impetigo contagiosa (code No. 111.10)
- 2 Ecthyma (code No. 110.105.1)
- 3 Sycosis barbae (code No. 161.103)
- 4 Acute infectious eczematoid dermatitis (code No. 110.100.5)
- 5 Simple superficial pyoderma (code No. 1.100.1)
- 6 Secondary infections of other dermatoses

The offending organisms are usually hemolytic *Staphylococcus aureus* and/or the streptococci

Treatment

- A Oral Medication Systemic anti-infectives may be tried if the skin infection is resistant to local treatment if it is extensive or severe and accompanied by a febrile reaction if it is complicated or if it involves the face and danger areas (e.g. area of upper lip, nose and eyes) (See pages 496-514)

Penicillin in daily doses of 300,000 units i.m.

(CAUTION) is convenient and effective for this purpose but may be modified in dosage. Other antibiotic drugs may be substituted as the individual case demands (see page 514)

B Local Measures

- 1 Cleanse area gently with mild solution of soap and water
- 2 Soaks or compresses to involved area 15 minutes b i d (see pages 98-99)
- 3 When skin is softened by soaks gently open larger pustules and trim away necrotic tissue
- 4 Local anti-infective agents are of proved value. These may be tried individually until effective agent is determined allowing 3-4 days for evaluation. They should be applied initially at night and protected by dressings. Soaks should be applied during the day. After the area has healed any of these preparations may be applied 2-4 times daily.
 - a Neomycin Sulfate U.S.P. 0.1% in water locally q d
 - Iodochlorhydroxyquin ■ S.P. (Vioform®) 3% to apply b i d in cream or ointment form
 - Other antibiotics alone or in combination as ointments locally b i d to q i d. These include oxytetracycline, chlortetracycline and polymyxin B in combination with bacitracin or oxytetracycline, neomycin, Nioramphenol and erythromycin (see page 514)

5. Local age t s e of al e in c t a n c e s but attended by a
 reas ed risk of en tization r c t n s P icill and sulf
 thi role sho ld not b used in outm nt form

P ophyl xi

Cor ect pr pitating or agg avating fact rs systemic cau s
 (g d bet) o loc l caus (g m hanical or hemical skin
 if tations d scharges et)

CHRONIC SECONDARY INFECTIONS

Dete min ll possibl fa tors favo ing chroni ity Obt in
 bacterial cultur s and det rmin o gami m sensitivity to antibioti
 ag nt when ver posibl

T _tm _t

A Gen l M _ur

- 1 D i Well balance d and ad qu te in p oteins and v itamins
- 2 Co id r use of vig row syst mic anti inf ctiv therap

B Local M s s

- 1 Us lo limes ure as fo ac te s perfici l infection
- 2 T t underlying d miosis ac ording to t age and type f
 le io (s page 93 and 96 97)
- 3 Consid x ay the py if ll othe m sures ar in ffective
 This must be es v d fo th specialist

ACUTE and CHRONIC INFECTIONS of SKIN APPENDAGES

Exami e fo loc l and yst mic c s of these infectio
 particula ly if they be me s ve or hroni Th f llowing d r
 rd s s in l ded

- 1 Folliculiti pustula (code N 161 yx2)
- 2 F runculosi (od No 161 100 0)
- 3 Carbu la (cod No 18 100 2)
- 4 H dr dentis (code No 152 100)

T _tm _t

A Gen r l M _ur Use vigorous systemic anti inf ctive th n
 apy if l o s eve et n s e mpli at d o located
 in d m a ca (ab t e k d h d) T t ycline USP
 250 mg by mouth d ily fo s e l week s at iples lfo
 amid (T f yi® Tri omb ul®) t blet d ly may b
 t ed f r h s i f tin

B Local M _u s

- 1 Avoid o manipulation f inflam d a e
- 2 U mod to dry he t to help l g m ins loc liz
- 3 U e p op r rgical inci l p ition or d b id m t
 after l glons a e mature

COMPLICATIONS OF SKIN INFECTIONS

If pathogenic bacteria from infections of the skin invade deeper structures one of the following may be produced and other more serious infections may also occur

- 1 Cellulitis (code No 18 110)
- 2 Acute lymphangitis (code No 54 100 1)
- 3 Acute lymphadenitis (code No 55 100 1)

Treatment

A General Measures

- 1 Bed rest with immobilization of affected extremity or part
- 2 Systemic anti-infective agents must be administered in effective doses (see page 514)
- 3 Analgesics as necessary for pain (see page 31)

B Local Measures

- 1 Immobilization of affected part in slightly elevated position
- 2 Local heat to area using warm moist compresses if abscesses or pustules are present. Avoid maceration of skin (use no occlusive covering)
- 3 Local anti-infective agents to open infected areas at night

FUNGAL INFECTIONS OF THE SKIN

GENERAL CONSIDERATIONS

Diagnosis

Usually based on

A Characteristics and Location of Lesions. (See below)

B Laboratory Examination

- 1 Direct demonstration of fungi in 10% potassium or sodium hydroxide preparations of scrapings from suspected lesions
- 2 Cultures of organisms
- 3 Skin tests are not reliable except that a negative reaction to Trichophyton has exclusive value when a dermatophytid is under consideration
- 4 Staining of histologic sections with periodic acid-Schiff technic

Treatment

A Local Measures

- 1 Treat acute cutive fungal infections initially as if dermatitis (see page 93) if may be severe the dermatitis before instituting fungicidal treatment
- 2 Most fungicidal agents are extremely easy to over-treat. AVOID

B General Measures and Prophylaxis

- 1 Keep skin dry. Moist skin favors
 - a Cool climate where excessive perspiration and activities infrequently after
 - b Other clothing

- e Sandals open toed shoes should be worn as they permit adequate drying of feet
- III Attention of skin should be reduced or controlled
- (1) General prophylactic measures
 - (a) Systemic therapy: Phenobarbital
U.S.P. 15-30 mg ($\frac{1}{4}$ - $\frac{1}{2}$ gr) tid to qid
 - (b) Antidandruff drugs (e.g. salicylic) are usually ineffective
 - (2) Local measures
 - (a) Talc or other drying powders (see page 89)
 - (b) Drying ointments (see page 88-89)
- g Toughen skin by gradual daily sunbaths or by quartz lamp treatment
- 2 Foci of fungal infections should be eradicated or controlled
- a Treat the umbilicus groin webs of toes and other areas where fungi are found
- III Group of immunity shows or blemishes unless actively supervised should be avoided

TINEA CAPITIS (Ringworm of Scalp) (code No. 162.211)

This contagious dermatological condition occurs almost exclusively in children. It is very persistent but is spontaneous in a proportion. The lesions are originally red and scaling and eventually form a scaly alopecia. Plots on the scalp with Wood light is characteristic in Microsporum infection (90% of cases in some areas). There is often a history of contact with infected individuals. Household pets

Treatment

A General Measures No

B Local Specific Measures Many require 2 months or more to cure the disease. The human type is more difficult to treat than the animal type (dogs and cats).

- 1 Scalp cleaning and preparation (Netsch et al.)
 - a Clip hair closely every 2 weeks and have patient wear a clean hair covering for protection
 - b Wash scalp as necessary
- 2 Fungicidal action. Rub the ointment into scalp morning and night after scalp has been washed.
 - a Sclerolalid N.F. 5% in C. base (500 mg ointment) (polyethyl glycol)
 - b Miconazole and a Miconazole ointment (Whitehead) one-half strength (R 34 page 104)
 - c Sulfur 10% in Miconazole ointment (R 36 page 104)
- 3 Epilation. Use Waxing or 250 Wt. purple X-ray treatment daily by two sessions by adhesive tape treatment
- 4 X-ray therapy used effectively and may work when topical and mechanical measures fail. X-ray therapy must be given by trained personnel only. Do not re-epilate with x-rays

Prevention

A Individual

- 1 Exchange of hairgear must be avoided

III Versicolor and Corporis

- 2 Infected individuals or household pets must be vigorously treated and re-examined for determination of cure
- 3 Scalp must be washed after barber shop haircuts

B Group

1 Routine school surveys may be advisable

2 Epidemic precautions

- a Wood light examination of students less than 12 years old
- b Isolation of infected individuals in special classrooms
- c Careful follow up of infected individuals and periodic re-examination of all children until all cases are cured
- d Education of barbers regarding handling of infected individuals

PITYRIASIS VERSICOLOR OR TINEA VERSICOLOR

(code No 11 208)

A mild condition characterized by tan or pinkish erythematous macules of variable sizes mildly pruritic usually on the upper trunk. Healed areas remain depigmented for a few months. Coarse blunt hyphae and large spores in clusters may be demonstrated easily in skin scales prepared with 10-15% sodium hydroxide.

Treatment

A General Measures. Encourage good skin hygiene

B Specific Measures. One of the following may be used

- 1 Sodium thiosulfate 10% aqueous solution b.i.d.
- 2 Mild Whitfield ointment 1/4 1/2 strength (B 34 pag 104) at bedtime

TINEA CORPORIS OR TINEA CIRCINATA

(Body Ringworm) (code No 130 211)

Body ringworm is characterized by single or multiple (relative ly few) scaly papules circular in shape with clear central areas and with minute vesicles in the actively spreading periphery. They are found most commonly on the trunk neck and limbs. Lesions occur occasionally as thick pigmented patches. Diagnosis should be confirmed by demonstration of the fungi.

Treatment

A General Measures (See page 86)

B Local Measures. Avoid overtreatment

1 Treat in proper stage of the dermatosis (see 23 98 97)

2 Fungicidal agents

- | | | |
|----------------------|------|-------|
| a R Salicylic acid | 0.3 | gr v |
| Sulfur ppt | 0.8 | gr xv |
| Hydrophilic ointment | | |
| q.s. ad | 30.0 | 3j |

3 g Locally b.i.d.

b Compound Undecylenic Acid Ointment N.F. may be used in the less chronic and nonthickened lesions

Prophylaxis

1 General Measures on page 86

2 Avoid contact with infected household pets

3 Avoid contact with clothing without adequate laundry

TINEA CRURIS (Inguinal Ringworm or Jock Itch) (code No 146 215)

Erythematous macular lesions with sharp margin cleared center and thin spreading peripheral rim in intertriginous areas (chafing of friction areas) such as groin, scrotum and axilla. The fungus should be demonstrated in differential condition from a bacterial dermatitis.

Treatment

- A General Measures See general rules (page 86) but also
- 1 Drying powder (page 99) should be dusted into involved areas 2-3 times a day especially when perspiration is excessive.
 - 2 Nothing keep area clean and dry but avoid overthing.
 - 3 Prevent intertrigo or chafing by avoiding over exertion; this predisposes to further infection and complication.
 - 4 Clothing Avoid rough tight clothing.
- B Local Measures
- 1 Treat top of dermal lesions (see page 93) and a lightly inflamed or inflamed lesion is best treated with petrolatum ointment applying soothing and drying solution to involved areas. Use wet compresses of Potassium Permanganate U.S.P. 1:10,000 (or 1:20 Aluminum Acetate Solution U.S.P.) in case of any general infection to be taken by the bath.
 - 2 Fungal dermatitis
 - a Sulfur ointment 10% (see page 101)
 - b Wash solution of iodine (of more than 1% tincture) boric acid
 - c Calcium Fenchyl Solution N.F. (Castile soap) 1/3 strength on a day
 - d Compound Underside Aids Ointment N.F. boric acid Sulfur 10% and Iodine (see page 104)

DERMATOPHYTOSIS (Tinea of Palms and Soles) (code No 112 211)

A relatively common skin disease occurring on the palms and digital areas with a characteristic cyrtic or curvilinear well-demarcated peripheral lesions in the interdigital spaces (Vesicular lesions of the feet are most commonly due to fungi but on the hands are more commonly due to other causes).

Contact dermatitis but also infections and reactions to the various allyl urea and mercaptide lesions in the subcutaneous and beneath the nail bed in the broad ligament. Diagnosis should be confirmed by demonstration of fungi.

Treatment

- A General Measures See General Measures (page 86) but put special emphasis on personal hygiene
- 1 Rubber or wooden sandals should be used in community show and bathing place.
 - 2 Open toed shoes and sandals should be worn generally.
 - 3 1% Sodium Hypochlorite Solution N.F. foot baths before and after bathing in community show and foot baths before and after drying between the feet.

88 Versicolor and Corporia

- 2 Infected individuals or household pets must be vigorously treated and re-examined for determination of cure
- 3 Scalp must be washed after barber shop haircuts

■ Group

1 Routine school surveys may be advisable

■ Epidemic precautions

- a Wood light examination of students less than 15 years old
- b Isolation of infected individuals in special classrooms
- c Careful follow up of infected individuals and periodic re-examination of all children until all cases are cured
- d Education of barber regarding handling of infected individuals

PITYRIASIS VERSICOLOR OR TINEA VERSICOLOR (cod No 112 208)

A mild condition characterized by tan or pinkish very fine scaly macules of variable sizes mildly pruritic usually on the upper trunk. Haled as a rem in dep gm t d for a f w mo the Co rse blunt hyphae and large pores n clu t s may b dem n str led easily in skin s l s prepared with 10-15% of m hydro ide

Treatment

- A Careful Measures Encourage normal skin hygiene
- B Specific Measures One of the following may be used
 - 1 Sulfur 10% aqueous solution bid
 - 2 Mild Whitening ointment 1/4 1/2 at gth (R 34 p 104) at bedtime

TINEA CORPORIS OR TINEA CIRCINATA (Body Ringworm) (code No 130 211)

Body ringworm is characterized by single or multiple (relatively few) scaly papules circular in shape with clear central areas and with minute vesicles in the actively spreading periphery they are found most commonly on the trunk and limbs. Lesions occur occasionally as thick pigmented patches. Diagnosis should be confirmed by demonstration of the fungi.

Treatment

- A General Measures (See page 86)
- B Local Measures Avoid overtreatment
 - 1 Treat the proper stage of the dermatosis (see 93 and 97)
 - 2 Fungicidal agents

a 5% Salicylic acid	0.3 g v
Sulfur ppt	0.9 gr xv
Hydrophilic ointment	
q s ad	30 g 3i
 - 3 Sig. Locally bid
 - b Compound Unguent of Salicylic Acid Ointment ■ F may be used in the last 4 months of the disease

Prophylaxis

- A General Measures on page 88
- B Avoid contact with infected household pets
- C Avoid exchange of clothing with affected persons

Treatment

A Q 1 M a r None

■ L a l M a r s

- 1 M n cal Sa d paper o fill daily (down to nail bed if necessary) ■ rg cal avulsion of th n ll m y be necessary
- 2 F gic d l genta Apply on i fect d n fls
 - a Iodine Tincture U S P 0 1 1 0% b i d
 - b Chrysarobin 4% i hlo form b i d
 - c Ch y robin U S P 0 1 0 5% in Petrolatum U S P b i d
 - d Whitefield s o tme t 1/2 strength b i d (S 34 p ge 104) Diamth ole D hydro hl r d N N ■ (Aste oi*) oi t m t 5% locally b i d
 - f Ve defam® liquid (od i m prop ionat s d um aprrylate prop i acid und yleni cid s licylic acid copp m dacyl nat) applied ■ i d
- 3 X y f ctio al dos (gi o ly by t ain d person el) may be of aid in m ld cases and m y requ e m nths for c re Some a thorit feel th t x y ha o plac in the tre tme t of o ychomy is

P phyl

See Gen i Co derat na p g 88

INFESTATIONS OF THE SKIN

SCABIES (ode No 110 261)

A mmo derm itit s ed by i feestation with Sa opt s s b nd h t s d by m l p u t s i e pust les s d c it on fo d most f equently in the f g r w ba body flex butt cks nipple nd g nit lia Th f m l mit can be d m tated th hi leai Scabies is f u d m o t f que tly u d nhyg c d i one with ■ t ry of po r to ab s Thi i f t ti ■ m a to b dia pp ng in th U S A

T tm t

A Q 1 M a r N e i d t d uni as seve es cond y prod m i p ent This m y eq ir yat mi ti f cti g nt pr i o with th ante bel tr atm t

■ Loc 1 M a r U le s i ons ar compl ated by e re se o da y py d m t eatm ti d ect d p m ly t wa d d i f st ion If s o d ry pruder m ■ t P laas m Pe mang ■ U S ■ so ■ (1 ■ 000) 1/2 h b i d t f i d m y b indicated b fo defl t v t tm nt

C D f ilv M a

- 1 G mm Be e He s hlo id U S P (Gamm ® Kw 11®) 1% n c e m b s 2 o applid a h ght for 3 ght (S 40 p ■ 104) It m y b d th p e c of i f t on His n w ■ d to b th t tme t f ch ic
- 2 S flu t atme t (do l m thod now ob ol t) P l m i a y b thng H p ti t ak a h w nd cr b vigo o ly with hot s p d w t b S lf ■ tm t 4 5% r bbed m th o ghly f ont k d wa t o t e h ght f 3 5 s e v n ght g l d b thi g i t t p i t ol to ch ge

- 6 Socks should be changed frequently
- 6 Dusting and drying powders p r m (see page 89)
- 7 Place small wads of cotton between toes at night
- B Local Measures Do not overtreat
 - 1 Acute stage (This will vary from 1 to 10 days) Treat as for any acute dermatosis using soaks (see page 88) for 20 minutes b i d or t i d If secondary infection is present use 1:10,000 Potassium Permanganate U S P soaks If secondary infection is severe or complicated treat as per directions on pages 84-86
 - 2 Subacute stage Any of the following may be used
 - a Zincundecate ointment b i d
 - b Whitfield's ointment 1/4 1/2 strength (R 34 page 104)
 - c Sol. of coal tar 5% in starch lotion or R 17 page 100
 - d Coal tar 1-2% in Lassar's paste
 - 3 Chronic stage Use any of the following
 - a Iodine as R 1 1% tincture paint on areas daily
 - b Whitfield's ointment 1/4 1/2 strength (R 34 page 104)
 - c Compound Uricolytic Acid Ointment N F b i d
 - d Alcoholic Whitfield's solution (R 46 page 105)
 - e Carbol Fuchsin Solution N F (Castellani's paint)
- C Manual Measures Remove or debride dead or thickened tissues after soaks or baths by careful manual techniques
- D X-ray therapy may be of value when hygienic and chemical means fail Must be given only by trained personnel

DERMATOPHYTIDS (Allergy or Sensitivity to Fungi) (code No 111 2115)

An erythematous vesicular or eczematoid dermatitis of hands (and less commonly of other skin areas) occurring secondarily to a tectant fungal infections and particularly following overtreatment of such infections. The id reaction will vary in severity with the activity of the local ones. Fungal elements present in the primary lesion but are not present in the secondary lesion. Test: phytoin 0.1 cc intracutaneously should give a positive reaction (it is read in 24 to 48 hours like a tuberculin test).

Treatment

- A General Measures None
- B Local Measures
 - 1 Treat lesions according to type of dermatitis (see pp 86-87)
 - 2 Treat primary focus as indicated

Prophylaxis

- S General Measures see on page 86

TINEA UNGUIUM OR ONYCHOMYCOSIS (code No 170 2)

A destructive condition of one or more (but rarely all) fingernails or toenails which begins at the lateral borders and often eventually causes deformity and even separation of the nail plate. Diagnosis should be confirmed by demonstration

GENERAL RULES GOVERNING CHOICE OF TREATMENT OF VARIOUS STAGES OF DERMATOSES

Recomm ded M d ments		Page
<p>ACUTE LESIONS Characteristics Rapid onset burning swollen itching blisters and oozing</p>	Soak For lesions limited to extremities	98
	Wet dressings For localized lesions of head neck trunk or extremities	98
	Best For generalized lesions	98
	Shak lotions	100
	Emollient	100
<p>SUBACUTE LESIONS Characteristics Intermediate duration burning itching and dryness</p>	Hydrophilic Ointment For (high powder content)	103
	Cold creams	103
	Crème (contain water)	103
	Vanishing cream	103
	Easy Ointment	104
<p>CHRONIC LESIONS Characteristics Long duration dry thickened scaly and crusted</p>	Soak	100
	Emollient	100
	Hydrophilic Ointment For (high powder content)	103
	Cold creams	103
	Crème (contain water)	103

Exact directions for choice of treatment will vary with the individual case. This will depend upon a wide variety of factors including characteristics of the dermatosis extent of lesions general character of patient's skin previous medication and drug allergies

- clothing or bed linen and not to bathe during this period
- d Final bathing On the day after the final treatment instruct the patient to take another scrubbing with hot soap and water in a shower and to change to all clean personal clothing. Bed linen must also be changed
 - e Soothing lotions It is often necessary to prescribe soothing baths (see page 86) and shake lotions (§ 14-15 III page 100) frequently following the treatment in certain patients with sensitive skins
 - f Personal clothing and bed linen must be laundered or cleaned

Prophylaxis

- A Good hygiene
- B Avoid intimate contact with infested individuals

PEDICULOSIS

Name of Disease

Synonyms

- 1 Pediculosis pubis (code No. 110.292) Pubic louse (c. abs.)
- 2 Pediculosis corporis (code No. 110.2912) Body louse
- 3 Pediculosis capitis (code No. 110.91) Head louse

Diagnosis

Diagnosis is dependent upon demonstration of lice or nits (eggs) with evidence of pruritic dermatitis. Scratch marks and pyoderma often tend to obscure primary puncta.

Treatment

- A Definitive Treatment 10% Chlorophenothan U.S.P. (DDT) in talcum or pyrophyllite is extremely effective in all forms of pediculosis
 - 1 Scalp Dust 2.5 to 5.0 Gm (37 1/2 to 75 g.) well into scalp and distribute evenly over scalp. In treatment patient not to wash hair for 1 week. Repeat treatment at end of 2 weeks
 - 2 Body With powder or spray and used
 - a Dust powder only on body surface. Make 5 to 10 Gm (75 to 150 gr.)
 - b Chlorophenothane (DDT) 5.0 g.
 - Ethyl aminobenzoate (Benzocaine®) 12.0 g.
 - Tween 80® 14.0 g.
 - Benzyl benzoate q.s. ad 100.0 g.
 Sig Dilute 1 part of this solution with 5 parts of water. Spray all hairy parts of body with about 20 cc of liquid. Protect the eyes. (CAUTION: Benzocaine is a sensitizer.)
 - 3 Pubis Dust powder 10 to 15 g and distribute evenly. Allow powder to remain for 2-3 days. Wash off with soap and water. Re-examine in 1 week and reapply if necessary.
- B General Measures
 - 1 Thorough bathing with hot soap and water
 - 2 Disinfection of discarded clothing in case of body lice. Autoclaving or suitable laundering methods must be used.
 - 3 Hairy areas in case of lice should be shaved to be clipped.
 - 4 Treat dermatitis (see pages 88 and 86-87)

Name	Action	Preparation	Technique
E Hydrophilic Ointment U.S.P.	Vaseline or For psoriasis or eczema Fungal For sebum	One may add 5% ammoniated mercury 1% salicylic acid 3% sulfur 5% dithionite solution of oil	Apply sparingly with fingering tip
F 3% Silylanilid N.F. in Cetowax 1500®	Follicular For scabies and pediculosis	Disperse 50 Gm of oil (ointment)	Locally bid to the scalp (It is not necessary to clip the hair)
G Gamma Benzene He chloride U.S.P.	For scabies and pediculosis	Dispense 30 Gm or 31	Locally bid for 1 to 3 days
H Aqueous mycin (0.1%)	For pyoderma	Nymycin 0.12 gr U Dithionite Q ad 1200 3/4	Apply with cotton bid to qid
I Methyrosaniline Chloride U.S.P. (Giant 1 let)	For monilia	Mycoseptic or 31 1% aqueous solution	Paint on with paint for occlusively
J Paraminobenzoic Acid N.F. in methylol (10%)	Protect from actinic rays	Dispense 50 Gm of U	Apply to exposed surface after morning
K Lassar's Paste (Zinc Oxide Paste U.S.P.)	Protective and soothing	Dispense 30 Gm of U	Locally bid

USEFUL MEDICATIONS FOR SKIN DISEASES

Name	Action	Prescr pti n	Techn c
A S t h and soda baths	Clean ing and soothing	1/2 cup ach of co nstar h and oda to a tepid bath	No soap The patient is bathed for 15 minutes in d abbed (not rubbed) dry
B Cool wet dressings Boric Acid U S P B P	Cooling soothing antiprur it	1 Tbsp to 1 qt or 1 liter of col w ter	Wri g out a washcloth or turkish towel and lay on the affected areas 15 minutes twice a d y or continuously Use no waterproof covering as one of the chief us s of these agents depends on the cooling effect of evaporation
b Alum um Ac tat U S P	Cl ansing mildly astringent	Domeboro powder 1 tsp to 1 qt r l l t r of cool water	(Note Boric acid and potassium p ma ganate are poisons and should not be us d internally or on large denuded a s s)
c Pota s um Perma ganate U S P B P	Deodorizi g	On 0 3 Gm (5 gr) tablet d solv d in 1 qt or 1 liter warm w ter	
C Hot w t dr s legs Magnes um S lfate U S P B P	P om tes blood flow Lo lizes infect ons and a d s ph gycosis	2 Tb p to 1 qt o 1 lit r of hot water	Apply s above using washcloth or turk h towel
D St rch U S P B P (Add 5% d t rge t soluti n f coal tar)	Sooth g and drying (keratoplast c and h aling)	R Sta h 36 3 x Zinc oxide 36 3 x Glyc m 18 3iv L me w t q s ad 180 3 i	Apply with cotton b l d

Type of Skin Lesion	Example	Methods of Local Treatment Always treat the skin with all types of dressings
5 Ulcer Simple perforated Deep pyogenic Dephlogistic Dephlogistic	Simple Ointment Tropical ulcer Trophical Ulcer	Wet dressing antifungal lotions and ointments
6 Urticaria Simple wheals Angiodermatoma	Hives Angiodermatoma	Antipruritic soothing bath and shock lotion
7 Fissure	Simple fissure	Silver nitrate dressing and ointment (old wet)
8 Eczema Severe Infected areas	Eczema Impetigo	Wet dressing debridement follow with hot lotion and grase Wet dressing debridement follow with anti-infective solutions and ointment
9 Dermatitis Acute Non-adherent scales (follicular) Gyrate	Pustules Exfoliative dermatitis Subacute	Keratolytic and later keratoplastic agents Wet dressings baths shake lotions emulsions and later grase Keratoplastic agents
10 Maculopapular	Itchy	Wet dressing shock lotion and powder

METHODS OF LOCAL TREATMENT OF VARIOUS TYPES OF SKIN LESIONS

Type of Skin Lesion	Example	Methods of Local Treatment Always treat the stage as well as type of dermatitis
1 Macule Simple erythema (asymptomatic) Burning erythema	Drug erythema Sunburn	Soothing wet dressings or shake lotions
2 Papule Maculopapular lesions Papulosquamous lesions acute chronic Annular lesions Lichenified lesions Verrucous lesions	Pityriasis rosea Psoriasis Psoriasis Acne vulgaris Lichen planus Verru vulgaris	Mild keratoplastic lotions and ointments Soothing wet dressings or shake lotions Keratoplastic and later keratolytic agents Keratolytic and astringent agents Keratoplastic and later keratolytic agents Keratolytic and caustic agents
3 Vesicle Multiple vesicles or diffuse weeping lesions Herpetic lesions Bullae	Eczema Herpes zoster Pemphigus	Soothing wet dressings during daytime and shake lotions or pastes at night. As process subsides change to pastes and creams Shake lotion at night Wet dressings during daytime and shake lotions
4 Pustule Impetiginous Ecthyma Furunculoid Follicular	Impetigo Ecthyma Furunculoid Syphilis barba	Wet dressings debris and antiseptic powders solutions and ointments Wet dressings debris and antiseptic solutions and ointments Wet dressings debris and antiseptic solutions and drainage (caution on lesions above lip) Wet dressings debris and antiseptic solutions and ointments

AGT	Act n	Range (C n c n ratio s U d	Mo t Common Str gth U d	P ep Comm ly Employ d St e gth
R 7 Mercury Chloride N F sem ill po t bl t	Ant Ant ptic		1 20 000 (0 01%)	O t bl et HgCl ₂ to 1 qt o 1 l t w t Poison Do not use on denuded areas
R 8 Pot i m Pe manganat U S P B P	Antiprur t Oxidizing Ant pt A stringe t	1 10 000 to 400 (0 01% to 2%)	1 10 000 0 01%	One 0 3 Gm (5 gr) t bl et KM O ₄ to 3 qt o 3 liters water or 0 1 Gm (1 1/2 gr) KMnO ₄ to 1 qt or 1 lit r water
POWDERS				
Name	P	tp on	In tructions and Rem ks	
R 9 Absorbent Gelat Sp ge U S P (o st il l)	G lf am ^o powder	10 0 Gm	Fo leg ulcers and the indole t ul ers It is absorbable hemostatic gelati Apply b t d	
R 10 Talc U S P (t leum)			Simple du tling p wder	
R 11 Foot powd imple	R S Ucylic cid Bor c a d Talc m	1 0 g x 1 0 gr x 100 0 3xxv	Simple powder	
R 12 U tling powder antipru tic	R Camphor powd r d Zinc o ide powder d Starch powdered q s ad	10 0 3 s les 16 0 3iv 100 0 3xxv	Simple antipruritic powder	
R 13 Chlorophenol U S P (DDT)	R DDT Talcum q s ad	10 0 3i s 100 0 3xx	Sig Apply 1/2 to 1 o over the entire ur face of underw ar and t eat s arms on inside of shirt a d trousers Remarks Effective against all p dicul is	

SIMPLE SOLUTIONS FOR SOAKS AND WET DRESSINGS

Indications For acute red swollen itching infected weeping or vesicular lesions
Technic Solutions must be applied cool (not for infestations)

- (1) Basin soaks (2-3 quarts of solution) for hands and feet 1-4 hours i.d.
 - (2) Wet dressings for localized lesions use turkish towel keep saturated with solution
 - (3) Open dressings for very acute lesions and when marked cleansing and soothing action is desired
- Frequent applications are necessary (1) for 1/2 hour b.i.d. to q.i.d.
 (b) Covered dressings should not be used

All of the solutions have a drying, soothing and cleansing action in addition to those mentioned

Agent	Action	Range of Concentration	Most Common Strength Used	Preparation of Solution of Most Commonly Employed Strength
Plain tap water	(See above)			
R 1 Sodium Chloride U.S.P. B.P.	(See above)	6:1,000 to 5:1,000 (0.5% to 5%)	0.9%	2 1/4 dr (2 tsp) NaCl to 1 qt water or 9 Gm NaCl to 1 liter water
R 2 Sodium Bicarbonate U.S.P. B.P.	Antipruritic	1:50 to 1:25 (2% to 5%)	3.0%	7 1/2 dr (3 tsp) NaHCO ₃ to 1 qt water or 30 Gm NaHCO ₃ to 1 liter water
R 3 Boric Acid U.S.P. B.P.	Antipruritic	1:50 to 1:25 (2% to 4%)	3.0%	7 1/2 dr (3 tsp) H ₃ BO ₃ to 1 qt water or 30 Gm H ₃ BO ₃ to 1 liter water
R 4 Magnesium sulfate U.S.P. B.P.	Antipruritic	1:50 to 1:25 (2% to 4%)	3.0%	7 1/2 dr (3 tsp) NaHCO ₃ to 1 qt water or 30 Gm NaHCO ₃ to 1 liter water
R 5 Aluminum sulfate Sol. U.S.P.	Astringent	1:200 to 1:10 (0.5% to 10%)	5.0%	4 Domeboro [®] tablets or 50 cc Burow's sol (N.F.) to 1 qt or 1 liter water
R 6 Silver Nitrate U.S.P. B.P.	Astringent Antiseptic	1:10,000 to 1:200 (0.01% to 0.5%)	1:400 to 0.25%	10 cc of 25% AgNO ₃ solution or 2.5 Gm AgNO ₃ to 1 qt or 1 liter water

Ag	Action	Range of Concentration	Mixture	Preparation of Solution	Comments
R 7 Mercury Bichloride N P small poison tablets	Antiseptic	1:10,000 (0.01%)	1:10,000 (0.01%)	One 0.3 Gm (5 gr) tablet KMnO ₄ to 3 qts or 3 liter water or 0.1 Gm (1 1/2 gr) KMnO ₄ to 1 qt 1 liter water	Commonly Employed Sterilizing solution. Do not use on denuded areas.
R 8 Potassium Permanganate U S P B P	Antiseptic Oxidizing Antiseptic Antiseptic	1:10,000 1:400 (0.01% 0.25%)	1:10,000 0.01%		
POWDERS					
Name	Description	Preparation	Instructions and Remarks		
R 9 Absorbent Gelatin Sponges U S P (sterile)	Gelatin powder	100 Gm	For leg ulcers and other indolent ulcers. It is absorbable hemostatic gelatin. Apply by dusting.		
R 10 Talc U S P (sterile)			Simple dusting powder		
R 11 Foot powder simple	Silicic acid Boric acid Talcum	10 gr 10 gr xv 100 0 3 xv	Simple powder		
R 12 Dustring powder nitrofurantoin	Camphor powdered Zinc oxide powder red Starch powder edqs ad	20 0 0 3as 1ss 18 0 3iv 100 0 3 xv	Simple antipruritic powder		
R 13 Chlorophenothene U S P (DDT)	DDT Talcum qsd	10 0 3ias 100 0 3xv	Sig. Apply 1/2 to 1 z over the entire surface of undrained areas and treat & areas on inside of shirt and drawers. Remarks: Effective against all pediculosis.		

LOTIONS AND EMULSIONS

Liquid mixtures containing ingredients in solution and/or suspension. Useful in a wide variety of localized and generalized skin lesions because of ease of application and removal. They have a marked drying effect and must be avoided if this effect is undesirable. The following are some useful well-known lotions.

Lotion and Action	Prescription	Instructions and Remarks
R 14 Calamine Lotion L S P (soothing drying)	<p>R Prepared calamine 10 0 3 iss Zinc oxide 10 0 3 iss Glycerin 2 5 3 ss Magma of bentonite 31 0 3 dss Lime water q s ad 2 5 0 3 xxxi</p>	<p>Sig Apply locally t i d q i d o r p r n Remarks Use for acute dermatitis Avoid excessive drying by prolonged use of this lotion (as with other non-oily lotions) Add 1% pt. for antipruritic effect</p>
R 15 Starch Lotion (antipruritic soothing drying)	<p>R Starch corn 24 0 3 vi Zinc oxide 24 0 3 vi Glyc rin 1 0 3 iii Lime water q s ad 120 0 3 iv</p>	<p>Sig Apply locally b i d and p r n Remarks Use for acute dermatitis Useful basic lotion to which other agents may be added</p>
R 16 Oily lotion (soothing drying lubricating)	<p>R Zinc oxide 10 0 3 iss Olive oil Lime water 25 q s ad 120 0 3 v</p>	<p>Sig Apply to all parts t i d q i d o r p r n Remarks Use for acute dermatitis Less drying than R 14 and 15</p>
R 17 Coal tar lotion (soothing drying keratoplastic)	<p>R Sol coal tar 12 0 3 i Zinc oxide 24 0 3 vi Starch 24 0 3 i Glyc rin 26 0 3 ix Water q s ad 120 0 3 iv</p>	<p>Sig Apply locally at night. Scrub in a.m. Remarks Use for subacute dermatitis Does not dry skin</p>
R 18 Sun screen lotion (protective)	<p>R Para amin benzole acid 3 0 3 i Emulsion base q s ad 30 0 3 ii</p>	<p>Sig Apply locally to skin before each exposure to the sun</p>

Lotion and A t t n	Preparation	In the treatment
R 18 Acne lotion	<p>R Sulf ppt — 3 6 3i</p> <p>Sodium borate 8 0 3i ss</p> <p>Zinc oxid 30 0 3i</p> <p>A to c</p> <p>Camph r water</p> <p>Rose water q s ad 120 0 3i</p>	<p>Sig Apply locally at night</p> <p>R m For acne</p>
R 20 Sulfur resorcinol lotion (drying antipruritic fungicidal keratolytic)	<p>R Sulf ppt 4 0 1</p> <p>Resorcinol 2 0 3 s</p> <p>Zinc oxide 25 0 3vi</p> <p>Talc 25 0 3vi</p> <p>Bentonite 5 0 3i</p> <p>Alcohol 50% q s ad 120 0 3i</p>	<p>Sig Apply locally at night</p> <p>Remarks For subacute and chronic dermatitis The sulfur and resorcinol concentration may be doubled or tripled if more stimulating effect is desired</p>
R 21 Tarsal lotion (keratoplastic)	<p>R Sulf ppt 20 0 3v</p> <p>Castor oil 8 0 3ii</p> <p>Alcohol 195% q s ad 120 0 3iv</p>	<p>Sig Rub small quantity into scalp at night</p> <p>Remarks All purpose scalp lotion</p>
R 22 Mercury allylic hair lotion (keratoplastic)	<p>R Mercury bichloride 0 1 gr i ss</p> <p>Sallylic acid 3 0 gr xiv</p> <p>Alcohol 50% q s ad 120 0 3iv</p>	<p>Sig Rub small quantity into scalp at night</p> <p>R marks All purpose scalp lotion</p>
R 23 Underskin lotion (antipruritic)	<p>R Aluminum chloride 20 0 3ii</p> <p>Glycerin 30 0 3i</p> <p>Distilled water q s ad 240 0 3viii</p>	<p>Sig Apply small quantity to underruns each morning</p> <p>R marks Useful antipruritic</p>

OINTMENT BASESIndications.

- 1 To correct fat deficiency in a dry skin
- 2 To provide mechanical protection to the underlying lesion
- 3 To help absorb or imbibe transudates from underlying lesions (This holds true only for the hydrophilic preparations)
- 4 To apply active ingredients to the skin

Contraindications.

- 1 Acute inflamed or infected lesions
- 2 Hairy areas (except the hydrophilic preparations)

Preparation		Preparation	Pharmacological Properties
OINTMENTS			
R 24	Petrolatum White USP White Soft Paraffin BP		Chemically inert. Retards penetration of incorporated medicaments in some cases.
R 25	Petrolatum Hydrophilic USP	3% cholesterol in petrolatum white wax and steryl alcohol	Favors penetration of incorporated medicaments. Imbibes water (hydrophilic).
R 26	Wool Fat Hydrophilic USP BP (lanol.)		Adheres well to skin. Stable. Favors penetration. Water sensitive.
R 27	Wool Fat USP BP (a hydrophilic oil)		Imbibes water. Favors penetration. Water sensitive.
R 28	2% Zinc Oxide Ointment USP BP	20% zinc oxide in liquid petrolatum, wool fat wax, and white petrolatum	Most chemical protection. Imbibes water. Makes ointment stiff. Ointment gives body to ointment. Makes it stick.
R 29	Theobromine Oil USP BP (Cocoa Butter)		Melts at body temperature.

P P t		Ad sent		p		pt		Ph m		log		P op t	
CREAMS (C t in w te)		Ad sent		p		pt		Ph m		log		P op t	
B 30 Hyd opall O tme t U S P		B M thyp rab P opyba ben St a yl al chol White p t ol tum Pr pyl e gly l Polyacryl 40 stearate P f d w t r q ad		0 025 g 0 015 gr 25 0 25 0 12 0 8 0 100 0		3 9 2 1/4 3 1 3 vi 3 III 3 1/4 3 v		P vo sp t ti n imb b w t good v bl l for w t r n i ble m dl aments					
B 31 R s w t O tme t U S P		R Sperma cl Wh t w x Expr ed alu nd oil S dium b te Ro e wat D still d wat Ro oil		12 5 12 0 56 0 0 5 5 0 14 0 0 02		3 l 3 III 3 vi gr vias 3 III/4 3 III 3 III/3		Cold c m (wat n oil) ooling nd soothing eff t					
B 32 Em lat n b se		R Dup 10 C C tyl lechol St yl l hol White p tr lat m H avy liquid petrol tum Butob n ^o D still d w te q s ad		1 6 7 0 7 0 20 0 11 0 0 05 100 0		3 v 3 III/4 3/4 3 v 3 3/4 3 xv		Non n sting and n riat g L messy than oth r creams and out m nte					
PASTES (High p wder nte t)		Promote ev porat n a d cooling d c ase v etc l t l n											
B 33 Z Oxide Past U S P (L s r P te)		R Zan xide Sta h P t olatum wh te q ad		25 0 25 0 100 0		3 vi 3 vi 3 xv		Mechanical prod tive Increas adhe lon b t d c es s pe t ation of m dicam nte (Add 2% chole terol or 5% c tyl alcohol to increas w ter imbibing power)					

OINTMENTS, MISCELLANEOUS STANDARD PRESCRIPTIONS

Common Name	Preparation	Instructions and Remarks
R 34 Ointment of Benzoic and Salicylic Acid U S P (Whitfield's)	<p>R Benzoin acid 60 100 Salicylic acid 30 34 Polyethylene glycol ointment q s d 100 0 34xv</p>	<p>Sig Apply locally to skin at bedtime Remarks Effective fungicide. Often best prescribed in 1/4 strength. Not for acute or subacute lesions.</p>
R 35 Aluminum acetate solution (L E S)	<p>R Alum acetate Sol N F 10 0 34xv Wool fat D D 3v Zinc oxide paste 30 0 31</p>	<p>Sig Apply locally to skin p r n Remarks Valuable on receding inflammatory process.</p>
R 36 Sulfur salicylic acid ointment	<p>R Sulfur 10 30 gr xv xlv Salicylic acid 10 30 gr xv xlv Petrolatum q s ad 100 0 34xv</p>	<p>Sig Apply locally to skin p r n Remarks Potent fungicidal combination for FOR ACUTE OR SUBACUTE LESIONS.</p>
R 37 Calamine cream	<p>R Hydrophilic ointment U S P 33 0 34xv Calamine lotion 66 0 34xv</p>	<p>Sig Apply locally to skin p r n Remarks Good general purpose cream. Useful vehicle for water soluble agents.</p>
R 38 Ammonio Mercurio Ointment U S P	<p>R Ammonio mercurii Liq id petrolatum Petroalum q s ad 50 gr 1 xv 30 34 100 0 3</p>	<p>Sig Apply locally to skin p r n Remarks For seborrheic dermatitis and psoriasis.</p>
R 39 Kaolin and sulfur ointment	<p>R Kaolin 10 0 34xv Sulfur ppt 10 0 34xv Zinc oxide ointment q s ad 100 0 34xv</p>	<p>Sig Apply locally at bedtime Remarks A good substitute exfoliating paste for acne.</p>
R 40 Gamma Benzene Hexa chloride U S P (Kw.)	<p>R Kwel® ointment 60 0 34</p>	<p>Sig Apply as directed Remarks Useful as abscide.</p>

SOLUTIONS TINCTURES AND PAINTS

Name	Preparation	Remarks
#41 Methyl Chloride USP (Gm an v l l) Cyanide USP	10% qu oil to	Ant pt (gram posit e gant me) d fu glide (monili)
#42 S d m Th Ute USP	10% q l l	P g d (p lly T c lo)
#43 St N t USP	10% aqu s l l	U l l m l i z g and t g t l t l f d and ulcers
#44 Ch y bin USP	4% an hlo fo m	F r m l i l p y bl
#45 N t om l N P (N t ph e)	0.5% (1300 t c t)	B cl e o s t e and g m d i agent
#46 Alc hol c Wh l f l d l l	2.5% y l d B z o l a c d A l h 140% q e ad 120 0.5	Apply l lly to sk n Effe ti fungi dal combin tion M y subalt t b y rum for al ch l
#47 B o Compound Tinct f, USP, B P	P l l t g b	Usef l t g n h for ab d d fi sur d l i d res
#48 S ft S p Lintm t USP L i m e t of S p B P	USP 65% p B P 8% o p (l k w n a tinct of l o p) T than l m Oleic ac d M l l o l l q e ad 100 0.5 y	U l u d e t g t Add up to fi e p a t of water to m ka shamp o
#49 T th lamin m l lon	M y l a t i n e Or l t b l ts (500 000 its per t ble) V g l l n ts (100 000 units) O t m e t (100 000 ts per Gm) D s t a g p w d r	T m e n t i c h o l c f r m o l i s l a
#50 Nyatati N N D (Myco t i l e)		

DERMATOLOGIC MEDICAMENTS

The following drugs may be incorporated singly or in combination in the lotion emulsions and ointment bases listed on pages 100 and 102. In general it is preferable to make preparations as simple as possible. The pharmacological action of the various drugs depends not only on the inherent chemical characteristics of the agents but also upon their concentration. Glycolic acid is astringent at 2-5% and at 10% it is cytolytic. On the other hand, salicylic acid may be used to achieve a common desired result. Preference for certain drugs may be based on actual superiority or only upon tradition. Agents and concentrations employed will depend upon the clinical characteristics of skin lesions and upon individual variations in tolerance. It is usually desirable to begin with weaker concentrations and to increase strength as indicated.

*Cannot be prescribed in cream bases only in the hydrophilic bases (e.g., Aquaphor, Eucerin, Carbowax 1500).

Type of Drug	Name of Drug	Concentration Employed
ASTRINGENT and/or DRYING (For use and abuse eruptions) These agents act by drying or hardening the skin. Do not use salicylic acid or tartaric acid on denuded areas	Alum. sub. 1:10 U.S.P. (1:10 Sol.)	15-20%
	Bismuth subnitrate U.S.P., Bismuth Carbonate, B.P.	3-15%
	Boric Acid, U.S.P., B.P.	4%
	Calcium, U.S.P.	17%
	Kaolin, N.F., Heavy Kaolin, B.P.	10%
	Salicylic Acid, U.S.P., B.P.	2-3%
	Tannic Acid, N.F., B.P.	1-10%
	Zinc Oxide, U.S.P., B.P.	20-25%
	Zinc Sulfate, U.S.P., B.P.	2-3%
	Ammonium dichromate U.S.P., B.P.	4-5%
	Althol, N.F. (For psoriasis)	0.1-0.25%
	Sodium chlorophyll U.S.P. (Vioform)	3%
	Sulfur, Precipitated U.S.P., B.P.	0.25-4%
	Sulfur, Precipitated U.S.P., B.P.	4-6%
KERATOPLASTIC and MILDLY STIMULATING (For subacute and chronic eruptions) These agents produce a counter irritation of the skin, causing inflammatory exudates to subside and rid the skin of the thickened areas	Tar, Coal Tar Solution, U.S.P.	1-6%
	Coal Tar U.S.P. (Prepared Coal Tar, B.P.) Pin Tar, N.F. (Tar, B.P.) Jundip Tar, U.S.P. (Oil of Cedar, B.P.)	3-10% 0.5-4%

STIMULATING and/ KERATOLYTIC (For hr i e pti) Th g t t by d e ol ing th b ny l yer of the k a d by m v g i deb a by deaquatio Th y als l ka i ky	Ammonit d m	Y USP BP	5 10%
	At h U N F U P		0 5 1 0% (C tio)
	Ch y bin USP		0 5 10% (C tio)
	R in l USP, BP		5 10% (Up t 40%)
	S licylle A d, USP, BP		6 10%
	S u Precipit d USP, BP		6 10%
	T C l To Sol d, USP		10 20%
	Coal T USP (Prepared C ad T BP) Pl e Y N F		5 20%
	(T BP) J p T USP (Oil f Cade BP)		2 10%
	Amn t d Me c ry USP BP		3 12%
BACTERICIDAL A id e f p l e illi and U amides in ol time ta (a l u e r e)	Iodocho hyd yu USP (V fo m b)		3 3%
	Oxyt y l Chl rti acylle e o t t acy l USP		1%
	S om y w B yth mye n or Chl mph nico l USP		1%
	Polymy n B S l f te USP w th B t USP o O ylet yel e USP		3 12%
	B o A d USP BP		3 10%
	S licylle A d USP BP		3 10%
PARASITICIDAL	S l f Precipit d USP BP		5 10%
	Zl c d te,		5 10%
	Sodi m Pr p l N F		5 15% O tm t
	Chl phe oha USP (DOT)		5 10%
	Benzyl B oal USP BP		15 30%
	Sul f r p plet d USP BP		3 10%
ANTIPRURITIC For pr fi r l f f t b i g Alw y d t m n e e f p t u e fi t	C mph Sp t N F		1 4%
	Co l T Sol l, USP		3 15%
	Ethyl Amn b te USP BP (B ocal)		5 10%
	Hyd o u USP		1 2 3%
	thol USP, BP		0 25 1%
	Ph l USP, BP		0 5 2%
CAUSTICS & d CORROSIVES	S licylle Acid USP BP		1 2%
	P d phyl m Res USP		25%
	S l l y l Acid Pl at USP		40%

Chapter 6

DISEASES OF THE RESPIRATORY SYSTEM

UPPER RESPIRATORY INFECTIONS

THE COMMON COLD (code No 300 100)

The common cold is a benign inflammation of the mucous membranes of the upper respiratory tract. Part or all of the upper passages may be affected and the manifestation will vary with the areas involved, the severity of the infection and the presence of complications. The etiology has not been determined but a virus is frequently suggested as the possible cause.

The diagnosis is often made by exclusion. Colds must be differentiated from the early stages of many of the communicable diseases which have a similar onset. One is justified in speaking of the common cold or no specific infections only when no specific organism can be found and the disease is a main localization.

A Local Manifestations. One usually finds inflammation of the mucous membranes of the involved areas.

- 1 Acute Rhinitis (code No 310 100) Nasal congestion and discharge
- 2 Acute Pharyngitis (code No 831 100) Sore throat with pain on swallowing
- 3 Acute Laryngitis (code No 330 100) Hoarseness, pain in swallowing and at times a dry cough

B General Manifestations. Malaise, generalized aches and pains, sweating and usually a mild fever.

Treatment

No specific treatment is known.

A General Measures.

- 1 Rest. In general, adequate rest preferably complete bed rest for the first 24-48 hours is of utmost importance. Further, patients usually feel much better and the danger of complications is apparently diminished by this regimen.
- 2 Fluid. Patients should be encouraged to drink fluids sufficient to prevent dehydration and to maintain a normal urinary output. There is no evidence that the course of the disease may be influenced in any way by forcing fluids to promote diuresis or by inducing diaphoresis.
- 3 Diet. Applicable well-balanced diet is to be preferred. Special diets and fasting regimes do not influence the course of the disease.

4. Drugs. In general it may be stated that no drug is known which has the ability to alter the duration or modify the severity of the specific infection. Drugs aimed at preventing complications are of little value.

A. Analgesics and antipyretics. These are often useful in making the patient comfortable except for the diaphoresis that is produced in a febrile patient. No one compound is any better than another for this purpose. Because of the relatively high toxicity the salicylates are preferred. Aspirin 0.3-0.8 Gm. (5-10 gr.) every 2-4 hours as needed may be given.

- b. Sulfonamides. The use of sulfonamides is limited only to bacterial infections. These are very few if any in the treatment of the common cold. These drugs in any way influence the course of the disease may be toxic and probably do little to prevent complications. They apply both to systemic and local use. If complications develop and are amenable to sulfonamides they should then be given.

- c. Antibiotics. These agents are of no value in the treatment of the nasopharyngeal infection. They may be of real value in preventing secondary complications from occurring by inhibiting the growth of invading organisms and thus altering the flora of the pharynx. In the use of these drugs the physician must be very careful in the use of these drugs. At times these drugs may be used prophylactically in patients with chronic viral infection. In the treatment of acute bacterial infections of the ear, nose, and throat, the use of these drugs is of value.

- d. Antihistamines. Many of these are having the very same effect as the antihistamines. There is no evidence that these drugs abort or alter the course of the common cold. All of the antihistamines are rather similar. The only one that is really different is the one that is used in the treatment of the common cold (U.S.P. 1000 N.D.) (see page 45).

B. Local Measures. Local measures have an influence on the course of the disease. They are usually applied to the nasal cavity.

1. Vasoconstrictors. These are employed to give temporary relief from nasal obstruction and/or rhinorrhea.

a. Inhalant (e.g., Amphenamine Inhalant U.S.P.) may be of benefit in mild cases.

- b. Nasal spray. The use of Ephedrine 5% in U.S.P. solution in 1% Phenylenedrine Hydrochloride U.S.P. (Naso-Synphrine[®]) in saline or Mild Naphazoline Hydrochloride 1% in U.S.P. (Prival[®]) in saline is of value. It is very difficult to find the very best of the vasoconstrictor drugs. It is not a good idea to use a vasoconstrictor drug for a long time and an excessive amount.

Oily preparations can be used for mild cases. The use of the 1% solution of Naso-Synphrine[®] 10 mg. (1/8 gr.) 4 times a day is sufficient in many cases. Ephedrine

Sulfate U.S.P. Ephedrine Hydrochloride U.S.P. B.P. 25-50 mg. (3/8-3/4 gr.) alone or combined with a mild antihistamine may be employed. Excessive use of these drugs should be avoided.

- 2 Throat swabs Swabbing the throat with an antiseptic agent is valueless in combating infection or altering the course of the disease and may be harmful. Strong antiseptics may be protein precipitants producing necrotic tissue which can act as a culture medium for pathogenic organisms. Waker solutions are washed away in a matter of minutes.
- 3 Gargling and throat irrigation These are of little value in affecting the disease but the heat of warm non-irritating gargle or irrigation may give marked transient relief of pain in cases of acute pharyngitis. Solution recommended for use are isotonic salt solution (1 tsp salt per quart or liter of water) or 5-20% glucose in water (1-4 tsp glucose or Kalc syrup per cup or 240 cc of water).

C Cough Medications The cough associated with an upper respiratory infection is usually caused by dryness and inflammation of the posterior pharynx and upper trachea. As a habit represents a physiological protective mechanism against downward drainage of infected material usually requires no therapy and should never be abolished completely. It may be suppressed but too exhausting, painful, prevents sleep or is a strain at the cause of existing conditions (e.g. immunologically suppressive). It can be alleviated or suppressed by a number of measures.

- 1 Voluntary suppression of the cough will usually prevent much of the coughing.
- 2 Sugar lozenges (glycolates) are usually soothing to the throat.
- 3 Inhalation of warm moist air (steam) usually relieves the cough. Compound Benzoin Tincture U.S.P. 1 tsp may be added to each quart of water but it is the moist air rather than any medication that gives relief.
- 4 Drugs for severe coughs
 - a Codeine Phosphate U.S.P. is the drug of choice. It should be given at an insufficient dosage to suppress but not to abolish cough. Usual dose for the child is 15 mg (1/8-1/4 gr) orally every 4 hours as needed.
 - b Expectorant cough mixture It is doubtful if any of the expectorant cough mixtures have any effect on increasing the bronchial secretion or on thinning the viscosity of the mucus. Some of the syrupy cough mixtures have a temporary soothing action in the oropharynx but neither more prolonged results are obtained with sweetened lozenges (cough drops). The cough mixtures include Terpin Hydrate Elixir N.F. syrup of ammonium chloride, Tolu Balsam Syrup U.S.P. Wild Cherry Syrup U.S.P. etc. The action of these is not enhanced in any way when it is added to the mixtures and it can now be given in tablet form.

D Local Heat Marked relief in the nose and throat can often be obtained from steam inhalations or exposure to warmth (hot water bottle or infra-red lamp over the nasal region).

Treatment of Complications

The principal complications of the common cold are extension to accessory structures in direct contact with the upper respiratory passages or secondary bacterial invasion of the mucous membranes.

and accessory structures. These usually require antibiotics or sulfonamides and may require the attention of an otolaryngologist.

Prophylaxis

The principal prophylaxis is similar to that of any contagious disease: avoidance of exposure whenever possible; avoidance of sudden changes of temperature and excessive fatigue. Administration of large doses of any of the vitamins, cold vaccines orally or by injection, gamma globulin or "hardening up" have all proved valueless in preventing or in altering the course of the disease.

ACUTE SINUSITIS (code No 32.130)

The acute infection of the paranasal sinuses following upper respiratory infections is usually caused by secondary bacterial invasion. The infecting organisms most frequently are streptococci, staphylococci or pneumococci.

Treatment

A Specific Measures

1. Penicillin is the drug of choice since most of the organisms are penicillin sensitive. It is administered as follows: 300,000 units penicillin procaine IM once or twice daily. Other wide spectrum antibiotics may also be employed.
2. Local administration of penicillin and other antibiotics by nose drops and use of negative pressure at all difficult to evaluate.

B General Measures

1. Bed rest.
2. Local external heat over the sinuses.
3. Analgesic. Aspirin or codeine may be used.
4. Vasoconstrictor drugs. Non-irritating nose drops may be used to facilitate drainage or drug may be given in tablet form by mouth for similar effect (see page 109).

C Debridement intrum sinu during acute sinusitis

EPISTAXIS (code No 301)

Epistaxis may be due to a variety of diseases or disorders.

A Predisposing Factor Blood dyscrasias, hypertension, arteriole sclerosis, other mineral deficiencies (e.g. iron deficiency of the liver), nasal ulceration, nasal angioma and retention of the infectious discharges (e.g. measles and hemorrhagic fever).

B Precipitating Factor External trauma to the nose, violent blowing of the nose, exerting, picking of the nose, increase of existing high blood pressure or lowering of atmospheric pressure.

C Location The bleeding site is most frequently on the anterior portion of the nasal septum, less often at the end of the inferior and middle turbinates and rarely further posteriorly.

- 2 **Throat swabs:** Swabbing the throat with an antiseptic agent is valueless in combating infection or altering the course of the disease and may be harmful. Strong antiseptics may be protein precipitants producing necrotic tissue which can act as a culture medium for pathogenic organisms. Weak solutions are washed away in a matter of minutes.
 - 3 **Gargling and throat irrigation:** The use of little value in affecting the disease but the heat of a warm non-irritating gargle or irrigation may give marked transient relief especially in cases of acute pharyngitis. Solutions recommended for use are isotonic salt solution (1 tsp salt per quart or liter of water) or 5-20% glucose in water (1-4 tsp glucose or Karo® syrup per cup or 240 cc of water).
- C Cough Medications:** The cough associated with an upper respiratory infection is usually caused by dryness and inflammation of the posterior pharynx and upper trachea. As such it represents a physiological protective mechanism against downward drainage of infected material usually requires no therapy and should never be abolished completely. It may be suppressed if it is too exhausting, painful, prevents sleep, or is a tedious cause of coexisting conditions (e.g., immediately postoperative). It can be alleviated or suppressed by a number of measures:
- 1 Voluntary suppression of the cough will usually prevent much of the coughing.
 - 2 Sugar lozenges (cough drops) are usually soothing to the throat.
 - 3 Inhalation of warm moist air (steam) is usually very soothing. Compound Benzoin Tincture U.S.P. 1 drop may be added to each quart of water but it is the moist rather than any medicinal action that gives relief.
 - 4 **Drugs for severe coughs:**
 - a Codeine Phosphate U.S.P. is the drug of choice. It should be given alone in sufficient dose to suppress but not to abolish cough. Usual dose for this is 8-15 mg (1/8-1/4 gr) orally every 2-4 hours per os.
 - b Expectorant cough mixtures. It is doubtful if any of the expectorant cough medicines have any effect on increasing the bronchial secretion or altering the viscosity of the mucus. Some of the syrupy cough mixtures have a mild but rarely soothing effect on the oropharynx but bitter and more prolonged results are obtained with sweetened lozenge (cough drops). The cough mixture include Terpin Hydrate Elixir N.F., Syrup of ammonium chloride, Tolu Balsam Syrup U.S.P., Wild Cherry Syrup U.S.P., etc. The action of codeine is not enhanced in any way when it is added to the mixtures and it can as well be given in tablet form.
- D Local Heat:** Marked relief in the nose and throat can often be obtained from steam inhalations or exposure to warmth (e.g., hot water bottle or infrared lamp over the nasal region).

Treatment of Complications

The principal complications of the common cold are extension to accessory sinuses, direct contact with the upper respiratory passages, or secondary bacterial invasion of the mucous membranes.

and accessory structures. These usually require antibiotics or sulfonamides and may require the attention of an otolaryngologist.

Prophylaxis

The principal prophylaxis is similar to that of any contagious disease: avoidance of exposure whenever possible; avoidance of sudden changes of temperature and excessive fatigue. Administration of large doses of any of the vitamins cold vaccines orally or by injection, gamma globulin or hardening up have all proved valueless in preventing or in altering the course of the disease.

ACUTE SINUSITIS (code No 32 130)

The acute infection of the paranasal sinuses following upper respiratory infections is usually associated by secondary bacterial invasion. The infecting organisms most frequently are streptococci, staphylococci, or pneumococci.

Treatment

A. Specific Measures

1. Penicillin is the drug of choice since most of the organisms are penicillin sensitive. It is administered as follows: 300,000 units penicillin sodium i.m. once or twice daily. Other wide spectrum antibiotics may also be employed.
2. Local administration of penicillin and other antibiotic by nose drops and use of negative pressure is still difficult to evaluate.

B. General Measures

1. Bed rest.
 2. Local external heat over the sinuses.
 3. Analgesic: Aspirin or codeine may be used.
 4. Vasoconstrictor drugs: Non-irritating nose drops may be used to facilitate drainage or drug may be given in tablet form by mouth for similar effect (see page 109).
- III. Do not instill anything in sinuses during acute sinusitis

EPISTAXIS (code No 301)

Epistaxis or nose bleeding may be due to a variety of diseases or disorders.

- A. Predisposing Factors: Blood dyscrasias, hypertension, arteriosclerosis, prothrombin deficiency (e.g., in hosts of the liver), nasal ulceration, nasal angioma, and extension of the infection to the sinuses (e.g., in nasal and rheumatoid fever).

- B. Precipitating Factors: External trauma to the nose, violent blowing of the nose, sniffing, "picking" of nose, increase of existing high blood pressure, lowering of atmospheric pressure.

- C. Location: The bleeding site is most frequently on the anterior portion of the nasal septum, less often at the end of the inferior and middle turbinates and rarely further posteriorly.

- 2 Throat swabs Swabbing the throat with an antiseptic agent is valueless in combating infection or altering the course of the disease and may be harmful. Strong antiseptics may be protein precipitants producing necrotic tissue which can act as a culture medium for pathogenic organisms. Weak solutions are washed away in a matter of minutes.
- 3 Gargling and throat irrigation These are of little value in affecting the disease but the heat of warm non-irritating gargle or irrigation may give marked transient relief of pain in cases of acute pharyngitis. Solutions recommended for use are isotonic salt solution (1 tsp salt per quart or liter of water) or 5-20% glucose in water (1-4 tsp glucose or Karo® syrup per cup or 240 cc of water).

C Cough Medication The cough associated with an upper respiratory infection is usually caused by dryness and inflammation of the posterior pharynx and upper trachea. A reflex irritant represents a physiological protective mechanism against downward drainage of infectious material usually requires no therapy and should never be abolished completely. It may be suppressed if it is too exhausting, painful, prevents sleep or so constrains eating and drinking. It can be alleviated or suppressed by a number of measures:

- 1 Voluntary suppression of the cough will usually prevent much of the coughing.
- 2 Sugar lozenges (cough drops) are usually soothing to the throat.
- 3 Inhalation of warm moist air (steam) is usually very soothing. Compound Benzoin Tincture U.S.P. 1 tsp may be added to each quart of water but it is the most irritating than any medication that gives relief.
- 4 Drug for severe coughs

Codeine Phosphate U.S.P. is the drug of choice. It should be given alone in sufficient dosage to suppress but not to abolish cough. Usual dose for the adult is 8-15 mg ($\frac{1}{8}$ - $\frac{1}{4}$ gr) orally every 2-4 hours as needed.

- 5 Expectorant cough mixtures If it is doubtful of the expectorant cough medicine showing any effect on increasing the bronchial secretion, alternating with dryness of the mucous membrane of the syrinx oropharynx, have them perform a soothing action in the oropharynx, but do not retard and more prolonged results are obtained with sweetened lozenges (or cough drops). The cough mixtures include Tepein Hydrate Elixir, N.F. syrup of ammonium molybdate, Tolu Balsam Syrup U.S.P., Wild Cherry Syrup U.S.P., etc. The action of codeine is not enhanced in any way when it is added to the mixture and it can always be given in tablet form.

D Local Heat Marked relief in the nose and throat can often be obtained from steam inhalations or exposure to warmth (as hot water bottle or infrared lamp over the nasal region).

Treatment of Complications

The principal complications of the common cold are extension to accessory structures in direct contact with the peripheral respiratory passages or secondary bacterial invasion of the mucous membrane.

that the maximum desensitization may be produced

1. Determine the offending allergen. This is usually accomplished by a careful history plus skin tests with antigens of known allergenic activity
2. Course of injection of allergen extracts. The material is given subcutaneously weekly or biweekly in increasing dosages. An average schedule that requires 10-20 weeks for desensitization is shown below. (This course must be repeated every year.)

Week	Dilution	Size of Dose	Noon or Pollen Units	Week	Dilution	Size of Dose	Noon or Pollen Units
1	1:5000	0.1 cc	20	11	1:50	0.1 cc	2000
2		0.2 cc	40	12		0.2 cc	4000
3		0.3 cc	60	13		0.3 cc	6000
4		0.4 cc	80	14		0.4 cc	8000
5		0.5 cc	100	15		0.5 cc	10,000
6	1:500	0.1 cc	200	16		0.6 cc	12,000
7		0.2 cc	400	17		0.7 cc	14,000
8		0.3 cc	600	18		0.8 cc	16,000
9		0.4 cc	800	19		0.9 cc	18,000
10		0.5 cc	1000	20		1.0 cc	20,000

If a shorter schedule must be employed, one can cut the above schedule in half by eliminating the 0.2 and 0.4 cc doses in schedules. However, in so doing, utility must be exercised to avoid reaction.

3. Maintenance dosages. When patient has completed the program of desensitization and hay fever season has begun, administer 0.2 cc of 1:50 dilution of extract (4000 noon units) every 1-2 weeks until season is over.
4. Continuous desensitization. If patient receives 0.2 cc of 1:50 dilution every 2 weeks throughout the year, the annual "boost" course can be started later, beginning with 0.1 cc of a 1:50 dilution (400 units) and continuing with above or as indicated schedule.
5. Attempt at desensitization on hay fever has begun gradually, meet with little success.

III. General Management

1. Drug

Corticosteroids (ACTH) and the corticosteroids have been shown to give complete relief from allergic rhinitis within 12-36 hours. If the offending allergen is not at hand, the drug is withdrawn, symptoms usually return but occur individually with seasonal hyfe may be satisfactorily relieved. The duration of the hyfe is on.

- a. Antihistaminic drugs give relief in 80% of patients initially; however, the relief tends to wear off as the season continues. Many antihistaminics are available, all have similar side effects of lethargy and drowsiness. The dose is variable with some preparations (page 45).

b. Ephedrine sulfate or ephedrine hydrochloride 25-50 mg

Treatment

- A Local Measures Have patient sit erect with head forward. If reclining there is danger of aspiration of blood.
- 1 Pressure over the bleeding site is usually all that is necessary. A small pledget of cotton moistened with hydrogen peroxide will usually stop the bleeding.
 - 2 Cauterization. When active bleeding has ceased touching the bleeding point with a bead of chromium trioxide (chromic acid) or trichloroacetic acid will usually prevent further bleeding. Electrocautery is also satisfactory.
 - 3 Severe bleeding in the anterior part of the nose can usually be controlled with a tampon introduced through the nostril. If bleeding is posterior it may be necessary to introduce a posterior nasal pack. This is done by the use of two strings attaching one string near each end of a rolled 2 x 2 or 4 x 4 gauze pad. A third string is tied at the middle of the rolled pad. A soft catheter is then introduced into the nasopharynx through one nostril and pulled out through the mouth. The end of one of the first two strings is tied to the oral portion of the catheter and pulled back through the nostril. The string is then removed from the catheter and the procedure repeated pulling the second string through the other nostril. The pack is guided through the mouth into the nasopharynx and pulled into place by traction on both strings. These are then tied over pad under the nasal septum. The third string is taped to the face and used later to remove the pack. Do not leave pack in more than 48 hours.
 - 4 Ice packs on the nose or to the back of neck are of no benefit.
- B Specific Measures Treat the underlying disease.

ACUTE TONSILLITIS (code No 634 100)

Acute tonsillitis is an infection of the tonsils caused by any of a number of organisms. It is characterized by both local and general symptoms of varying degree.

Treatment

Depends on the causal organism. (For streptococcal throat see page 461)

ALLERGIC RHINITIS (Hay Fever) (code No 310 392)

Hay fever is an allergic disorder which usually occurs in spring or summer and is characterized by rhinitis, sneezing, nasal obstruction, redness of eyes and itching of the nose, throat or eyes. Pollens are the most common allergen.

Treatment

- A Specific Measures There is no true specific treatment. Hypo-sensitization or desensitization is frequently beneficial and consists of administration of gradually increasing doses of the allergen (usually pollen) so as to induce an immunity in the susceptible individual. For best results therapy should be started 3-6 months before the onset of the hay fever season.

- 3 Sleeplessness Pentobarbital Sodium U S # Pentobarbital Sodium B # # 1 Gm (1½ gr) at bedtime should be given

CHRONIC TRACHEOBRONCHITIS (Chronic Bronchitis code No 350 100 0)

A chronic nonspecific inflammation of the tracheobronchial tree manifested by cough which is usually the only constant symptom. The cough may be productive or nonproductive. Do not diagnose chronic bronchitis on the basis of chronic cough alone. Any patient with a chronic cough should be given a thorough examination including a chest x-ray. As a rule a diagnosis of chronic bronchitis can be made only by exclusion. Primary chronic bronchitis is a rare disease almost all cases of chronic bronchitis are secondary to other respiratory conditions or inflammations. Intractable cases may have an allergic basis. Physical findings may be absent or a few bronchi and wheezes may be heard.

Treatment

A Specific Measures. There is no specific treatment for chronic bronchitis. Treat the underlying condition.

B General Measures

- 1 Remove or eliminate exciting causes such as smoking, exposure to cold, air damp atmosphere, industrial fumes, etc.
- 2 Drug. Ephedrine and similar drug given by mouth or nebulization e.g. Isoproterenol (Hydrochloride U S P) (Aldrine® Isuprel®) gives relief in many cases where bronchospasm is present. Potassium Iodide Solution N F 510 dose 10 to 15 cc at 4 to 6 times daily may be helpful.
- 3 Adequate rest in dust free room.
- 4 Optimum nutrition and hygiene.

BRONCHIAL ASTHMA (code No 350 390)

Bronchial asthma is a symptom complex due to a variety of causes. It is characterized by dyspnea especially of the expiratory type with wheezing and whistling which are due to edema of the bronchial lining and/or contraction of the smooth muscle lining the bronchi.

Diagnosis

A History of paroxysmal attacks of expiratory dyspnea frequently in an otherwise healthy patient with a definite allergic tendency. The attacks are precipitated by exposure to the allergenic factors by various methods.

B Physical Examination

- 1 During typical attack. Examination characteristic:
 - a. Severe expiratory dyspnea and asthmatic cyanosis.
 - b. Chest held in partial inspiratory position. Inspiration short and expiration greatly prolonged.
 - c. Cough difficult and may become violent.
 - d. Sputum thick and tenacious.
 - e. Chest hyperresonant to percussion.

with a barbiturate every 4 to 6 hours may give relief (see page 103)

- ii Sedation may be of value if patient is nervous or upset (see page 39)
- 2 Allergen free atmosphere
 - a Dust proof respirator masks can be used during the hay fever season
 - ii Air conditioning equipment to filter the air entering the patient's room may prove valuable
 - c An area free of the offending pollen can be visited during the pollinating period
 - d When dust is the offending agent prepare a dust free bed room as follows. Cover mattress and pillow with an allergen free material (plastic or sheet rubber). Remove all rugs carpets drapes bedspreads or other lint producing materials and remove all ornate furniture or other objects which are not easily dusted
 - e Household pets must be considered possible sources of allergens

DISEASES OF THE BRONCHI

ACUTE TRACHEOBRONCHITIS

(Tracheitis code No 340 100) (Bronchitis code No 350 100)

An acute nonspecific inflammation of the trachea bronchi is usually following an acute rhinitis or pharyngitis and usually accompanied by a low grade fever. A productive or non productive cough is present. Physical examination may be entirely negative or scattered coarse rhonchi may be heard over the chest.

Treatment

A Specific Measures

- 1 There is no specific treatment unless secondary infection is present
- 2 In severe cases prescribe inhalation by aerosol inhalation (see page 153) several times daily and/or penicillin 1000 000 units I.M. once or twice daily may be of value

B General Measures

- 1 Rest. Bed rest is most important in shortening the course of the disease
- 2 Control of cough
 - a Steam inhalation or eucalypted water or saline. The hacking cough of the dry stage is helped best by steam inhalations in a warm room. Compound benzoin tincture 1 tsp to each quart (liter) of water may be added
 - ii Codeine in small doses 15 30 mg ($\frac{1}{4}$ to $\frac{1}{2}$ gr) q 3 4 hours may be given to help control the paroxysms of coughing
 - c Ephedrine cough mixture will be helpful if bronchospasm is present (manifested by wheezing)
 - d Ephedrine sulfate or
 hydrochloride 1% Sol 30 0 31
 Codeine phosphat 0 5 gr vials
 Syrupy vehicle q.s. ad 120 ml iv
 Sig 4 cc (1 tsp) q 3 4 hours p.r.n. cough

B S e Att h Epn phrine responsive p tie ts (m y also fol low for t tus asthma ti u below)

- 1 Epn phrin injection inj 1 on of adr naline 0 5 1 0 c (8 m n) 1 1000 solut on ubcut and rep t e cry 30 60 minutes if ne essary
- 2 Ep phrin inhalati n o isoprote nol (is prel[®]) 1 100 by eb l e us g oxyg n for spray m y giv dram t elief M y r m at ev y 30 60 m n tes
- 3 Epn phrine in oil 1 500 0 2 1 0 c (3 15 m) I M for p o longed ff ct May h lp pr vent r u ence of att k and an be peated in 10 14 hours
- 4 Aminophylline (theophylline ethyle d amin) 0 24 48 Gm 3 3/4 7 1/2 gr) in 10 20 c (2 1/2 5 dr) salin lowly I V if attack not cont olled M y al o give this as r tal instilla t on or ctal suppository fl th same dose
- 5 S dat on must be ad qu t Us o e of the following
a Pentoba bit l eod um (p tob biton od um) 0 1 Gm (1 1/2 gr) at on e and may r p t
b Pa aldehyd 4 8 (1 2 dr) o lly in fruit ju e or rectally in 30 cc (1) ol
- 6 100% oxyg n (r 20% hel m w th 80% oxyg) inhalation by mask at 6 12 lt /minute may giv great i f f om dyspnea
- 7 Wh n availabl th se of oxyg n by int mittent posit ve m essur (g B nn ti v live) and b onchod lating e os is dminister d s m ltaneously through the sam pp atu m fords the mo t d am ti elief in sc t t k of thma As a b h od lat isop t r n l (i p el[®]) to be p e f d bec e t prod e a lesser d gr of syet m e a t th d pleph n
- 8 The pla f v f et n n low ring g ts (g Al va[®]) depolym i ng m ym (e g hyalu coides) o d g tive n ym (g t yp in) by os i in this cond t on i still n t d t min d Th advi ab lity f ing th l tter h re ntly been g st on d n v w of t ffects on the morphol gy f the c lla of the e m rat ry lining as w ll as t r tating lo al ff ct

C St tu A thm ti u and S v Att k in Epn phrin stant

P r t

- 1 Co t ct opin (ACTH) 25 50 unit of gel p p tion sub t I M o f th t o o lly m m d t l y and p t y 6 ho If th m tie t hosp tall d admin t o ti ot op (ACTH) 20 40 mg in I V d ip ove 8 12 h pe od v ry 24 h u s ACTH m y h ve a mor p d on i f t on but therw e both a sbo t qually H t v Hel f hould b vid t m 6 12 h e and alrn t m pl t f dom f m th all gi manif tations in 24 48 h u The m d t ion h ld p obably b co tin d fo 7 10 d y ing d ally d m m h g d s aft r the first 4 5 day
- 2 P tient sh uld b m p t li d if po sbl m an alle g f oom
- 3 100% xyg n 20% helium with 80% oxyg n should be given by m sk fo i f of dy p
- 4 Aminophylline (theophylline thyl diamine) 0 24 0 48 Gm

■ Chest full of musical rales which frequently may be heard at a distance

2 Between attacks May be entirely negative or show only scattered expiratory wheezes

- Differential Diagnosis Many diseases may simulate bronchial asthma. Of these the most important are cardiac asthma and generalized emphysema especially when chronic bronchitis is superimposed. The appearance of bronchial asthma in middle or old age should make one suspect bronchial neoplasm.

Treatment

A The treatment may be divided into two phases

1 Treatment of the actual attack

■ Interim therapy which is aimed at preventing further attacks

B Drugs used for the specific treatment of asthma. In the control of the acute attack certain therapeutic agents have come to be looked upon as specific for relief while other preparations are of value in aborting attacks. It is necessary to know the preparations available, their mode of administration and the indications for each. The chart on page 118 summarizes the important drugs.

Epinephrine (drenaline) is the drug of choice for the emergency management of acute bronchial asthma. However, it has been shown that corticotropin (ACTH) or cortisone can be used to stop an attack when all other measures fail. The onset of action of ACTH and cortisone is much slower than that of epinephrine but they should be employed concurrently with epinephrine in severe attacks of asthma. Epinephrine must be used cautiously in patients with cardiac asthma, hypertension or angina.

Treatment of the Acute Attack. Do not use morphine

A Mild to Moderate Attack Epinephrine (drenaline) is the drug of choice

1 Epinephrine injection (injection of adrenalin) 0.2 to 0.5 cc (3 to 7 min) of 1:1000 bicut

2 Epinephrine inhalation (1:100 in aqueous solution) by nebulizer every 15 to 60 minutes per nebulizer (see page 118)

3 Moderate attack Repeat epinephrine (drenaline) subcutaneous every 1 to 2 hours

4 Epinephrine in oil 0.2 to 1.0 cc (3 to 15 min) 1:500 I.M. may also be given at onset if a prolonged effect is desired. May repeat in 10 to 15 hours

5 Aminophylline (theophylline theine d.amin.) 0.24 to 0.48 Gm (3/4 to 1 1/2 gr) in 10 to 20 cc (2 1/2 to 4 dr) saline 1 way I.V. If thick sputum collected 0.48 Gm (7 1/2 gr) may be added to 500 to 1000 cc of saline and given by I.V. drip. May also give this as rectal instillation or rectal suppository in the same dose

6 Ephedrine sulfate or hydrochloride 25 to 50 mg (3/8 to 3/4 gr) with or without a barbiturate may relieve mild attack (see page 118)

7 Reassure patient that attacks can be controlled

8 Sedation Phenobarbital (Phenobarbital) 0.1 Gm (1 1/2 gr) immediately, may repeat 0.03 Gm (1/2 gr) q 1 hr

(3 3/4 7 1/2 gr) in 10 20 cc (2 1/2 5 dr) saline slowly I V and by rectal suppositories for immediate relief of symptoms 0.48 Gm (7 1/2 gr) may be added to 500 1000 cc of saline and given by I V drip

5 Sedation must be deferred until relief is obtained Use one of the following

a Pentobarbital sodium (pentobarbital sodium) 0.1 0.2 Gm (1 1/2 3 gr)

b Paraldehyde 8 15 (2 4 dr) in 30 cc (1 oz) oil by rectum

6 Surface tension lowering agents (Alvire®) by nebulizer may be helpful in some cases (see page 153)

7 If corticotropin (ACTH) or corticosteroids are not available

a As soon as epinephrine responsiveness returns use epinephrine as above Epinephrine may be administered cautiously i.e. 1:1000 solution in 1 liter of 5% glucose by intravenous drip (80 80 drops per minute)

b General anesthesia may be life saving

(1) Readjustment of 30 80 cc (1 3 oz) of ether in equal quantity of oil oil repeat in 12 24 hour if necessary Usually patient wakes free of attack

(2) If available anesthetic available inhalation therapy is the most satisfactory

8 Bronchospasm under general anesthesia is sometimes indicated to move tracheal tubes

D General Measures

1 Eliminate any known allergen if compatible with circumstances

2 Maintain adequate rest and relaxation by reassurance and diet

3 Respiratory infections must be treated vigorously with antibiotics directed I M or by aerosol

4 Fluids orally or parenterally to prevent dehydration

Intermittent Therapy

A Specific Therapy Attempt to determine which all of the following are contraindicated

B General Measures

1 Emotional disturbance should be corrected when possible

2 Good living hygiene should be promoted

3 Exercise with apparatus in interictal asthma (usually due to infection of bronchi) may be helped by antibiotic therapy (see page 114 and 120)

4 Ephedrine hydrochloride 25 50 mg (3/8 3/4 gr) with or without phenobarbital (phenobarbital) 15 30 mg (1/4 1/2 gr) every 3 6 hours may prevent or delay occurrence

5 Aminophylline phenobarbital pulses

3 Aminophylline 0.2 g 111

Ephedrine hydrochloride sulfate 0.025 g 3/8

Phenobarbital 0.015 gr 1/4

Signal pulse every 4 hours

6 Antihistaminic drug may give relief in some patients but this is a broad statement generally based on clinical appointments (see page 45)

DRUGS USED IN THE TREATMENT OF BRONCHIAL ASTHMA

Preparation	Dose	Mode of Administration and Indication
Epinephrine Injection U S P Injection of Adrenaline B P (1:1000 dilution of the hydrochloride in aqueous solution)	0.2 to 0.5 cc (3 to 15 μ) may repeat up to q 30 minutes if necessary 1 cc (15 μ) in liter of 5% glucose solution Give at 60 to 80 drops per minute	Subcut. This is the most commonly used preparation I V Caution Reserved for severe acute attacks when more conservative measures fail
Epinephrine in Oil Injection U S P (1:300 dilution)	0.2 to 0.5 cc (3 to 15 μ) May repeat in 10 to 14 hours Duration of action is 3 to 4 hours	Subcut or I M usually given with aqueous epinephrine to patients with severe or current asthma
Epinephrine Inhalation U S P (1:100 dilution in aqueous solution)	0.5 cc in nebulizer Individualize dose 4 to 8 inhalations usually suffice	Glass nebulizer operated by hand bulb or pressure from an oxygen tank or nebulizer with intermittent positive pressure breathing (IPPB) (see page 148) Most useful in aborting attacks
Isoproterenol U S P (Isuprel [®]) (1:100 dilution in aqueous solution) For inhalation only	(Isoproterenol causes less vasoconstriction)	
Isoproterenol tablets (3 to 15 mg)	Sublingual, individualize dose	May be useful in aborting attack
Corticotropin (ACTH)	10 to 40 mg by continuous I V drip over 24 hours or 25 mg of regular or gel I M every 6 hours initially	Decreases tolerance in prolonged use Used for severe attacks and status asthmaticus
Cortisone	See page 423	Orally
Aminophylline Injection U S P B P (Theophylline Ethylenediamine)	0.24 to 0.48 Gm (3/4 to 7/8 gr) in 10 or 20 cc saline May repeat in 3 to 4 hours Duration of action 1 to 3 hours	I V slowly May be used with or without epinephrine Valuable in severe attacks when patient is eupneic in fast
Aminophylline U S P rectal suppository	1 suppository every 12 hours	Useful only when prolonged life is desired
Ephedrine Hydrochloride U S P B P or Ephedrine Sulfate U S P (capsule or pill)	25 to 50 mg (3/8 to 3/4 gr) every 3 to 6 hours May combine with phenobarbital 15 to 30 mg (1/4 to 1/2 gr) or phenobarbital sodium 30 mg (1/2 gr)	Orally Of little or no use in acute attack May be of some value in aborting an attack or decreasing the number of attacks
Antihistamine drugs	See page 45 for dosage	Orally Of little use in acute attacks May be of value in aborting attack or decreasing number of attacks

po umonitis appears t be of less v lu than dir ct inhal tions

- 3 St eptomy in aerosol (s p ge 153) m y also be of ben f t in ome pati t espec ally th e in wh m penicillin res at anc urs Ea il cc should cont in 50 250 mg of st pto mycin d pending on c centr t o desired Administer in th s me manner as fo p nicillin (s bove)
- 4 Combined p nia lin streptomy in aeros l m y be of bene f t in many cases Use th sam o centr tion for th drugs as us d individually
- 5 Oxy t a ycline (T mycin[®]) l also ava lable for a osol admin t t on (50 mg /cc in propylene glycol) and m y be used as abov (See pag 153)
- 6 En yme by s l may b of value in obtaining bette dr usag of th ck m pl ated mate ial (s page 153)

B G l M s s

- 1 Postural d in ge Postur l dr inage l s prov d to be the m t effective ngle meas for the symptomat c r l ef of pati t with bronchi tasis Th patient hould assume the po ition that gi es him the maximum d in g and this var with the loc tion of th le ion Exp ien w ll help the pati t dete mine th best po it on to Sinc m at les ons a at the lung b es the most mmon method i f the patie t to lie p on cros the edg of th b d with fold d a me r st g on a pill w on th floor maintaining this post n fo 10 15 min t s Two to four time a d y i s ally suff c t the f r t d ai ag being just upon awak ening a d th last ju t befo bedtime
- 2 Avo dan of upp ratory infect on is ve y important in ontrolling th bro hial inf tion
- 3 Cor t on of as i t d d e Many p t nts with b n chi t is suff from chronicuppe respir tory infections with post as l drip This m t b cor ted wh neve s ibl
- 4 Climat Although limet does not ur a w m d y li m t oft is of b eft sp cially in s itt ndet duc the in idenc of upper respi t y inf tions Av id a du ty m ke filled atm ph e
- 5 R st Patient with vere di ease should lway hav m q te r t in b d for symptoms often am lhorat d by this mea ure The f ot of the b d hould be raised l to 12 in hes
- 6 Good nutrition and h alth are v y impo tant Ad qu te food and m w ll aid in lowing the prog s of th d s s Sm king hould b prohibited
- 7 B on ho op drain g is of v lue in t lly in all cas s to lminate bron hial tenos o ob struct on cont buting facto It m y b n c s y to dal te th teno d bro hus but peat d bro h c py i not advis d

C S gi l T t m nt Pre ntly acc pted indrcation in lud

- 1 Y ung p i nt in good condition who are having bron o r urring ymptoms of any d gre Mod rn surgery will p mit e ction of f rly st nsive bilat r l diseas
- 2 P tie t up to 60 years of age who s e h vings s v s sympt m

- 7 Patients who are not helped by other measures may be treated chronically with small doses of corticotropin (ACTH) or one of the cortisones. The dosage employed is just sufficient to keep them comfortable and relatively free of symptoms.

BRONCHIECTASIS (code No 350 100)

Bronchiectasis is a chronic progressive disease of the bronchi and bronchioles characterized by dilatation of the bronchi or bronchioles, the presence of varying amounts of infiltrative infection and finally destruction of the involved parts and of the surrounding tissue. The etiology in many cases is unknown but congenital factors and chronic or recurrent pulmonary infections undoubtedly play a role.

Diagnosis

A History

- 1 Chronic cough usually productive of much purulent sputum and more marked upon arising in the morning.
- 2 Recurrent attacks of pulmonary infections with aggravated cough, fever, sweats and chills. Hemoptysis is common.

B Physical Examination Chest findings except in severe cases or during acute pneumonitis are rarely significant. Rales in lung bases and some wheezed pectoriloquy are the most common findings.

C Laboratory Findings

- 1 X-ray. Routine chest x-rays are usually insufficient to make diagnosis. If chest x-ray is negative and bronchiectasis is suspected further studies are necessary.
 - a Bronchoscopic examination
 - b Bronchograms (x-rays of chest following instillation of iodized oil into bronchi either through bronchoscope or directly into the trachea) are most important for diagnosis. These must be made by an experienced radiologist.
- 2 Sputum. The sputum is usually found to separate into 3 layers. Bacteriological studies always reveal mixed infections usually with streptococci and staphylococci predominating.

Treatment

A Specific Measures Treatment with antibiotic agents has been of benefit in temporarily ameliorating symptoms especially during the acute exacerbations but has had no lasting effect. The amount of sputum and cough is reduced and the patient is better but these benefits wear off in a few weeks to months. The treatment should be repeated as necessary and may be of greater benefit in milder cases or in debilitated patients where surgery is considered too radical a procedure. When possible predominant organisms should be identified and their sensitivity to the various antibiotics determined.

- 1 Penicillinase resistant (see page 153 for technique) 50 000 100 000 units of crystalline penicillin G in 1 to 2 cc saline solution q.i.d.
- 2 Parenteral use of penicillin except during attacks of acute

A Mild to Moderate Cases Penicillin is the drug of choice although broad spectrum antibiotics or sulfonamides are almost equally effective. Equal mixtures of sulfadiazine and sulfamerazine or sulfisoxazole (Gantrelin®) are to be preferred whenever sulfonamide drug are demonstrated (see page 496).

1 Penicillin

a Dosage

- (1) Slow absorption type Penicillin procaine in aqueous suspension or in oil 300 000 units I.M. daily will usually suffice. 300 000 unit bid may be advisable in some cases.
- (2) Intramuscular Penicillin 15 000 to 20 000 unit quous penicillin very 3-4 hours.
- (3) Intramuscular Penicillin 100 000 units aqueous penicillin very 8 hours.
- (4) Penicillin 200 000 units by mouth every 4 hours is usually satisfactory but generally only of penicillin should be reserved for use after initial favorable response to penicillin.

E Dication Continue penicillin until patient has been afebrile for 72 hours and white blood count normal.

2 Broad spectrum antibiotics Continue until patient has been afebrile for 48-72 hours and white blood count is normal.

Chlortetracycline Hydrochloride U.S.P. (Achromycin®) 0.25 Gm q 6 h.

Oxytetracycline Hydrochloride U.S.P. (Terramycin®) 0.5 Gm q 6 hours.

Tetracycline U.S.P. 0.25 Gm q 6 h.

Chloramphenicol U.S.P. (Chloromycetin®) 0.5 Gm q 6 h u.s.

Erythromycin U.S.P. (Erythrocin®) 0.3-0.5 Gm q 6 h r.

3 Sulfonamides

a Dosage (Give 2 Gm of methicillin twice with a 1 Gm dose of sulfonamide.)

(1) Sulfadiazine U.S.P. 4.0-5.0 Gm (60-75 g) at once orally and 1.0 Gm (15 g) very 4 hours.

(2) Sulfadiazine and Sulfamerazine U.S.P. 2.0-2.5 Gm (30-37½ gr) of each orally a dose of 0.5 Gm (7½ g) of each every 4 hours.

(3) Sulfisoxazole U.S.P. (Gantrelin®) 4.0 Gm (60-75 g) orally at once and 1 Gm (15 gr) very 4 hours.

b Duration Continue therapy until patient has been afebrile for 48-72 hours and white blood count is normal.

B Moderate to Severe Cases Penicillin to be preferred but broad penicillinase resistant sulfonamide may be used in patients sensitive to penicillin.

1 Penicillin In severe cases give intramuscular quous penicillin dose of 100 000 unit very 3 hours day and night or 1 million units of penicillin procaine I.M. very 12 hours. Continue penicillin therapy until patient has been afebrile for 72 hours and white blood count is normal.

2 Broad penicillinase resistant. Onset of tetracycline 0.5 Gm very 6 hours.

(especially recurrent hemorrhage) from predominantly unilateral disease and who are otherwise good surgical risks

DISEASES OF THE LUNGS

PNEUMONIAS

Pneumonia consists of inflammatory changes of the parenchyma of the lung almost always associated with or due to infection. In the past it was customary to classify the pneumonias into anatomic types (i.e., lobar and bronchial) but this classification serves little useful purpose at present. In view of the ever growing number of antimicrobial agents one should classify the pneumonias on the basis of etiology and treat with the appropriate agent.

The pneumonias are still the most common cause of pneumonia. In general it may be stated that the management of all the pneumonias follows the same principles as those governing the management of pneumococcal pneumonia.

PNEUMOCOCCIC PNEUMONIA (code No. 380.101)

Diagnosis

- A History Usually sudden onset with chills and fever. Often pleuritic pain is present with cough.
- B Physical Finding Vary with extent of infection and duration of the process from nonproductive to massive consolidation of one or more lobes.
- C Laboratory
 - 1 Sputum Purulent usually tinged with blood (light pink to the color of prune juice).
 - 2 All patients with pneumonia (especially if severe) should have the following laboratory examinations in addition to routine urine and blood studies: chest x-ray, sputum smear and blood culture.

Treatment

Before beginning therapy it is advisable to obtain sputum and blood for culture in order to determine the exact bacterial invader. This is imperative if the infection is severe.

Therapy varies with the severity of the disease. Determine the severity according to the criteria shown in the chart on page 125 and treat as outlined below.

Specific Measures

Penicillin is the drug of choice in pneumococcal infections. Chlorotetracycline, oxytetracycline, tetracycline, chloramphenicol and erythromycin are also highly effective in most pneumococcal infections but are probably slightly inferior to penicillin in severe infections. The sulfonyl amide drugs are also effective but their response to penicillin is usually more rapid and complete and are less frequent.

Therapy Based Upon Evaluation of Factors Influencing Prognosis

Fact	Mild or Moderate	Sev	Very Severe
Age	Under 40	Over 40	
Organism count in sputum/oil field	Under 30	30-75	Over 75
Lob in oled	Singl	2 or 3	4 or 5
Pleat	Under 120	Over 120	Over 140
Blood pressure			Shock or pulmonary edema
Syst li	Over 90	Under 90	
Di stol	Over 60	Under 60	
Leukocyte count	Over 10,000	6,000-10,000	Under 6,000
Alb min f	0.60++	+++ to +++++	
Ass t d d e a e	0 to mild	Moderate	Severe
Complications	Non or st il flus on	Empyem lung abscess et	Meningitis endocarditis
Blod cultu	Negative	Positive	
Pneumoco typ	High typ	I II III IV VII	
Mortality %			
Ra g	0-10%	25-10%	10-30%
Ave ag	0-4%	4%	20%
Therapy indicated	Under 100 of penicillin broad spectrum antibiotic or sulfonamides	High dose of penicillin broad spectrum antibiotic or sulfonamides	Mas doses of penicillin

(Modified from Moore's Penicillin Foundation Medical Bulletin VI 31 January 1948)

may be administered in several ways. The soft rubber facial mask of the BLB OEM or Bennett type is probably best. With this mask oxygen concentrations up to 85% may be easily furnished. Oxygen tent is generally used if patient is too ill to wear mask who would otherwise move the mask. However, the tent is generally advised because the average concentration of oxygen is only about 40-50% and unless watched carefully carbon dioxide may accumulate.

B Fluid. Fluid intake must be decided whether given orally or parenterally to maintain a urine output of at least 1500 cc. Patients taking sulfonamides should have sufficient alkalizing powder so that the urine is above pH 7 at all times. Potassium bicarbonate should be used in patients with actual or potential heart failure being careful to avoid potassium toxicity.

C Diet. During the severe acute phase patients usually have little desire for food. During this short acute phase food intake is of little importance. Patients who develop complications and have long convalescence should be placed on high protein high vitamin high calorie diet.

Symptomatology and Supportive Measures

A Toxemia. The treatment and activity of the toxin in the blood which may occur in severe pneumococcal must be controlled.

3 Sulfonamides

- Sulfadiazine Sodium Injection U S P or Sulfamerazine Sodium Injection U S P 5.0 Gm (75 gr) or sulfadiazine and sulfamerazine 2.5 Gm (37½ gr) of each, in 500 cc (1 pt) M/6 sodium lactate I V as soon as diagnosis is made
 - At the same time give 4.5 Gm (60.75 gr) sulfadiazine-sulfamerazine mixture or sulfisoxazole (Gantrisin®) orally
 - Continue with 3.4 Gm (45.60 gr) sulfadiazine-sulfamerazine mixture or sulfisoxazole (Gantrisin®) every 4-6 hours together with 1.2 Gm (15.30 gr) sodium bicarbonate with each Gm of sulfonamide. If patient is unable to take oral medication he may be maintained on 5 Gm (75 gr) sodium sulfadiazine or sodium sulfamerazine or mixture of the two in 500 cc M/6 sodium lactate I V every 6 hours watching the electrolyte balance. If alkalinosis develops give the sodium sulfadiazine or sodium sulfamerazine in a line. Do NOT administer sulfonamides in glucose, blood, plasma or amino acid solutions.
- C. Vary Severity Cases Patients with very severe pneumonias should receive massive penicillin therapy in an attempt to achieve a pneumococcal concentration of penicillin in infected areas as rapidly as possible. Combinations of penicillin and broad spectrum antibiotics or sulfonamides offer no advantage over penicillin alone.
- 1 Penicillin 3 million units of aqueous penicillin I M every 2 hours or continuous administration of penicillin solution of 10-12 million units daily by I V or I M drip until favorable clinical response occurs
 - 2 Chlorotetracycline oxytetracycline or tetracycline 0.5 Gm I V every 12 hours or chloramphenicol or erythromycin 0.5 Gm every 6 hours until favorable response occurs
 - 3 Sulfonamides As for severe form. Give 5.0 Gm (75 gr) sodium sulfadiazine or sodium sulfamerazine as a mixture of the two I V at once and follow with oral or I V maintenance as indicated. Always maintain adequate alkalization and fluid intake.

Evaluation of Therapy

If there is no response to therapy in 24 to 36 hours completely re-examine cases for cause.

- A Locate & Diagnose Infection may be caused by microorganism resistant to anti-microbial agent used. Where etiology of pneumonia is in doubt broad spectrum antibiotics are usually preferable to penicillin.
- B Support of Pneumonia Treat as for very severe. If not already doing so substitute one of the tetracyclines or chloramphenicol for therapy already under way.
- C Development of Complications 1 empyema lungs abscess endocarditis meningitis
- Presence of an associated disease that may give fever

General Measures

- A Oxygen is very important in any patient with severe or moderately severe pneumonia cyanosis or marked hypoxia and

from the intestines

- 2 Neostigmin Methylsulphate U S P (1 2000 Sol) 1 cc (15 m) subcut and insertion of a tracheal tube will generally produce rapid initial decompression
- 3 Stomach tube dilatation of the stomach Suction through a nasal tube passed into the stomach is unnecessary

F C d ac Abnormalities

- 1 Congestive failure In elderly patients or patients with preexisting heart disease congestive failure may be precipitated by the procedure When this occurs digitalization by one of the rapid methods is indicated (see page 197) This must be distinguished from the development of pulmonary edema (see page 126)
- 2 Cardiac arrhythmias The occurrence of extrasystoles is common and generally requires no treatment If atricular fibrillation flutter develop rapid failure may be precipitated Digitalization by one of the rapid methods is generally indicated in these cases (see page 197)

Complications

For treatment of these complications see the respective areas (Modified after Collen)

Complication	% incidence
Stale pleural effusion	4.5
Empyema	0.3
Lung abscess	0.3
Pneuritis	0.3
Endocarditis	0.1
Meningitis	0.1

All pleural effusions associated with pneumonic must be aspirated promptly if they are empyema which may be stated immediately (see page 141)

STREPTOCOCCIC PNEUMONIA

(Lobar code No 360 102) (Bronchopneumonia code No 361 102)

An uncommon type of pneumonia, usually secondary to a preceding pulmonary infection (i.e. viral pneumonia influenza meningitis) Onset is most often gradual but at times sudden with severe intoxication marked dyspnea and cough with bloody or mucopurulent sputum Pleural effusion occurs early is fairly common and may progress to empyema Most cases are due to pneumococcus

Physical findings vary with severity there may be only a slight dullness and moist rales In severe cases pleural effusion obscures pneumonia signs Thorax is usually reddened and has some exudate

Treatment

Penicillin is the drug of choice Dose is similar to that for pneumococcal pneumonia

to save the patient from exhaustion or circulatory failure

1 Paraldehyde is the drug of choice for this purpose

- Oral 8 cc (2 dr) at once if there is no response in 30 minutes repeat dose until patient is quiet. Then give 4-15 cc (1-4 dr) every 3-4 hours per rectum until restlessness
- Intramuscular If patient is unable to swallow give 4 cc (1 dr) at once if there is no response in 30 minutes repeat dose until patient is quiet then give 4 cc (1 dr) i.m. every 3-4 hours per rectum until restlessness

2 Barbiturates Mild restlessness and sleeplessness can be treated with the following drugs

- Phenobarbital sodium (phenobarbital sodium) 0.5 Gm (1 1/2 gr) at bedtime
- Phenobarbital (phenobarbital) 15-30 mg (1/4-1/2 gr) tid during the day

B Shock and Pulmonary Edema The usual cause of death in pneumonia is shock (or circulatory collapse) and/or pulmonary edema. The most important factor in management of these conditions is very early recognition and prompt vigorous treatment. Therapy is essentially the same in both conditions

1 Treatment of SHOCK see page 27

2 Treatment of shock Because of the important role of anoxia in the production of shock and pulmonary edema in pneumonia prompt initiation of oxygen therapy preferentially with positive pressure facial mask is of the utmost importance

C Cough Generally requires little therapy and clears spontaneously with adequate treatment. Expectorants are of little value if cough is severe. Codeine may give relief and help patient to sleep

1 Codeine phosphate 0.03-0.06 Gm (1/2-1 gr) orally or subcutaneous every 3-4 hours

2 R. Ephedrine sulfate

or hydrochloride (1% Sol) 30-60 gr

Codeine phosphate 0.5 gr vial

Syrup of wild cherry or

other vehicle q. d. 120-180 gr

Sig. 4 (1 t.p.) q 3-4 hours per rectum cough

D Pleuritis Pa

1 Mild pain Ethyl chloride spray for cutaneous anesthesia. Spray for about 1 minute over area of pain and rub it carefully over entire area of pain so that a line of frost appears. The method gives excellent relief in 15-30 minutes in 90-100% of patients.

2 Severe pain Procaine hydrochloride infiltration (1% 1% Sol) is injected subcutaneous in a vertical line passing through the area of greatest pain and 5 cm higher and lower.

3 Very severe pain Meperidine Hydrochloride U.S.P. (Demerol®) 50-100 mg appears to be drug of choice for treatment of pleuritic effect on the respiratory and cough reflexes.

E Abdominal Distention Abdominal distention generally due to air swallowing associated with severe dyspnea is frequent in patients with pneumonia

1 Oxygen therapy in high concentration (90-100%); usually most useful because the oxygen is very rapidly absorbed

from the intestine

- 2 Nitroglycerine Methyl sulfate U.S.P. (12000 Sol.) 1 cc (15 m) about 1 inch in the lumen of a rectal tube will generally produce spontaneous decompression
- 3 Stomach tube for dilatation of the stomach. Insertion through a nasol tube passed into the stomach is necessary

Fluid Therapy

- 1 Congestive failure. In elderly patients or patients with pre-existing heart disease congestive failure may be precipitated by the pneumonia. When this occurs digitalization by one of the old methods is indicated (see page 197). This must be distinguished from shock and pulmonary edema (see page 188).
- 2 Cardiac arrhythmias. The occurrence of extrasystoles is common and generally requires no treatment. If auricular fibrillation or flutter develops rapid failure may be precipitated. Digitalization by one of the old methods is generally indicated in these cases (see page 197).

Complications

For treatment of the complications see the respective diseases. (Modified after Collin)

<u>Complication</u>	<u>% Incidence</u>
Stripped pleural effusion	4.5
Empyema	0.3
Lung abscess	0.3
Pericarditis	0.3
Endocarditis	0.1
Meningitis	0.1

All pleural effusions associated with pneumonia must be tapped promptly to detect early empyema which may be treated surgically (see page 141).

STREPTOCOCCIC PNEUMONIA

(Lobar code No 360 102) (Bronchopneumonia, code No 361 102)

An uncommon type of pneumonia usually secondary to a preceding pulmonary infection (i.e. virus pneumonia, influenza, measles). Onset is most often gradual but is sometimes sudden with severe intoxication marked dyspnea and cough with bloody or mucopurulent sputum. Pleural effusion occurs early and is fairly common and may progress to empyema. Most cases are due to patholytic streptococci.

Physical findings vary with severity. There may be only a few dullness and moist rales. In severe cases a pleural effusion obscures pulmonary signs. Thorax is usually reddened and has a small exudate.

Treatment

Penicillin is the drug of choice. Dosage is similar to that for pneumococcal pneumonia.

STAPHYLOCOCCAL PNEUMONIA (code No 381 105)

An uncommon type of pneumonia usually secondary to preceding infection. The onset is usually gradual and progressive to gravity. Cough and dyspnea are common. Multiple lung abscesses occur frequently. Patchy consolidation with diffuse rales are often found. Sputum is variable in appearance.

Treatment

Sensitivity tests should be performed. Pending the results of the tests the following should be given: *I.M.* every 6 hours Erythromycin U.S.P. (Erythrocin®) 0.5 Gm. Novobiocin N.N.D. (Cathomycin® Albamycin®) 0.5 Gm. Chloramphenicol U.S.P. (Chloromycetin®) 0.5 Gm. Bacitracin U.S.P. 20 000 units.

FRIEDLANDER'S PNEUMONIA (code No 381 131)

Pneumonia due to *Klebsiella pneumoniae* is often associated with chronic debilitating diseases. The onset is usually sudden with chills, fever, dyspnea, cyanosis, cough and marked toxicity and in most cases progresses rapidly to a fatal termination. There is a tendency to necrosis and abscess formation in the subacute or chronic forms. Early recognition is imperative for favorable outcome.

Physical findings are variable and extensive involvement may give only dullness and diminished breath sounds. Sputum is reddish mucoid and tenacious giving a currant jelly appearance. White blood cell count is variable; may have leukopenia or leukocytosis.

Treatment

A Specific Measures Treatment of Friedlander's pneumonia is a very severe infection.

1 Streptomycin 1 Gm. every 6 hours until favorable response is seen then 0.5 Gm. every 6 hours until afebrile 3 days and 2 One of the tetracyclines (I.M. or I.V.) or chl. ramphenicol 0.5 Gm. every 6 hours or Gantrisin® 1 Gm. every 6 hours. Continue for 2 weeks.

B General Measures See Pneumonia code 381 124.

HEMOPHILUS INFLUENZAE PNEUMONIA (code No 381 115)

A rare form of pneumonia which usually is rapid in onset and progression. The outstanding features are severe inflammation of the bronchi and bronchioles leading to bronchiectasis and hemorrhagic edema of lungs. Patients are extremely toxic.

There is a patchy consolidation and the sputum is bloody. Leukopenia is frequently present.

Treatment

A Specific Measures Continue treatment for 7-10 days after temperature has returned to normal.

1 Combined streptomycin and sulfonamide therapy: the treatment of choice. Streptomycin 0.5-1 Gm. every 6 hours I.M.

and if named as f v r y s v e p n m = al p e u
mon (p ge 124)

2 Combin d t t c y l i n s (I M o I V) o c h l m p h e o l
0 5 Gm v y 6 h o u s p l u s M o n a m i d a s f o e v e r

■ m o c a l p u m n i s

B G e e l M S P e m o c i P m o i a p g e 124

PRIMARY ATYPICAL (VIRUS) PNEUMONIA (code No 360 160)

Virus pneumonia is most commonly has a gradual onset with chill
n s mild fever non productive cough malaise and headache
The patient usually does not appear too ill and for this reason the
disease in most cases is not recognized

The physical findings are variable may be absent or how
small areas of r pitant ral nd oc onal dullness The fever
reaches peaks 2-3 days and follows by lysis for the next 10 days
In every case fever may last for weeks

Röntgen examination of chest reveals patchy consolidation
The histology findings are usually within normal limits Cold
glutinin test positive in about 50% of cases throughout
the

Treatment

A Sp f ■ n e s Give o f the t t y lines 0 25 0 5

Gm e y 6 h u s o a l l y I V the apy may be ces ry in
ev re es or f p t i e t i s v m a t i g m a y b c o m b n e d w t h
o a l t h e p y e s t a n t G v e 0 5 Gm e r y 12 h o s

B G e e l M S P e m o c c P n e m o n a p g e 124

PULMONARY TUBERCULOSIS (code No 360 123)

Diagnosis

One of the principal problems in the diagnosis of tuberculosis
the finding of early cases before symptoms are present The only
way to do this early case is by periodic x-ray examinations of the
chest When the characteristic symptoms of cough weight loss
and night sweats appear the diagnosis is usually clear The
certain step that must be followed in making a diagnosis of a
pulmonary tuberculosis

A E x a m i n a t i o n f a P u l m o n a r y L e s i o n A l w a y s c h e c k p o s i t i v e
x r a y f o r l u m b a r a n y p o s s i b l e N e v e r a s s u m e a p t n t
he does not have pulmonary tuberculosis without a negative
examination of the chest

B P r o o f T h e L e s i o n T u b e r c u l o u s

1 Skin test The intradermal method is the most reliable B
gun with 1:100000 O.T. If this is negative give 1:1000 if
this is negative is 1:100 In single PPD test with last
test given if this is negative use 2 d t g t h The test is
read in 48-72 hours and at least 5 mm induration (with or
without tenderness) is required for a positive test

With few exceptions a negative reaction to tuberculin in the dilution of 1:100,000 or weaker strength does not exclude tuberculosis.

- 2 Recovery of tubercle bacilli. This is the only certain method of establishing the diagnosis. However, this may occasionally be difficult and it may be necessary to institute treatment on the basis of a strong presumptive diagnosis (i.e., a typical x-ray lesion in a young person with a positive skin test who has been in contact with an active case). In the absence of sputum, a gastric or bronchial lavage may be necessary. Bronchial lavage is done by spraying the pharynx and hypopharynx several times with 1% Pontocaine®. The patient should be fasting in order to avoid aspiration if emesis occurs. With the aid of a laryngeal mirror, 5-10 cc normal saline is injected between the vocal cords via a curved cannula. The patient coughs this out into a sterile container. Injection of saline may have to be repeated several times to get an adequate specimen (approximately 15 cc). The specimen may be examined for tumor cells as well as for tubercle bacilli. The patient must not take anything by mouth for two hours after the procedure.

Non-pathogenic acid fast bacilli may occasionally cause confusion, especially in smears of gastric contents. Guinea pig inoculation will differentiate these from tubercle bacilli. When tubercle bacilli cannot be recovered, other diagnostic possibilities must be considered.

C. Activity of a Tuberculous Lesion. Once tuberculosis has been diagnosed, the status of the lesion must be determined to decide if therapy is needed.

- 1 Presence of tubercle bacilli in the sputum is evidence of activity.
- 2 Either progression or regression of the lesion by x-ray especially within short periods of time indicates activity.
- 3 A cavity is usually evidence of activity.
- 4 Other manifestations suggesting activity:

a Afternoon fever	b Pleurisy with or without effusion
c Night sweats	d In reabsorbed blood sedimentation rate
e Blood streaked sputum	f In reabsorbed blood sedimentation rate
g Weight loss and/or fatigability	h Mentation rate
- 5 Any newly discovered tuberculous lesion should be considered possibly active. If this cannot be immediately determined, sputum studies should be continued together with close observation by monthly x-rays for 2-3 months. If no change occurs and ultimately for tubercle bacilli remain negative, the interval between films can be lengthened, but observation should be continued for at least 2 years.

Treatment

- A Rest. Bed rest and mental relaxation in cheerful comfortable surroundings, either at home or in a sanatorium, should be instituted whenever an active lesion exists or is probable. This is still an important measure in the therapy of pulmonary tuberculosis. Although the duration of the rest period required has been reduced by the antituberculosis drugs, bathroom privileges may be permitted where symptoms are minimal or absent.

- 1 Advantages of sanatorium care. Most authorities prefer sanatorium care to home treatment. The several advantages to institutional management:
 - a Will control and sympathize with the chief occupation of the case of tuberculous patients
 - b Educational instruction in the care of tuberculosis by means of a well organized program
 - c Contact with other persons who have the same disease and in the problems. Observation of the success of a well controlled program of rest
 - d Complete break with old environment and more complete mental and physical rest
 - e Medical observation more frequent and control of management more complete
 - f Planned program of gradual increase of activity and recreation under well trained personnel
 - g Active therapy (if drug collapse surgical etc) more easily be administered
 - h Isolation program can more easily be enforced than even if the patient is discharged

- 2 Advantages of home care. Home care is sometimes desirable but safety of other family members undisturbed rest period administration of medicine etc must be provided for. Advantages and indications:
 - a Less financial burden to a private patient
 - b For patient unable to adjust to institution or because of a bleeding home if it can sometimes be stabilized by the mere presence of the patient

B Drug Therapy. This has become the most important measure in the treatment of tuberculosis. It is indicated in all cases of active disease and is most effective when administered in conjunction with a well regulated program of bed rest as well as all possible therapy when indicated (see below). In general the return to limited physical activity is permitted sooner with drug therapy and gradual ambulation may be started as soon as clinical improvement is well established.

Duration of drug therapy in pulmonary tuberculosis. The general recommendation is of prolonged administration of combination of the drugs isoniazid (INH) and streptomycin (a pyrimidine). Many patients seem to be efficient on prolonged treatment even after moderate retreatment of the organism to the drugs has been shown by sensitivity tests. Most authorities advise a minimum of 12 months of drug treatment after the final status (National Tuberculosis Association 1955) has been attained. It should be emphasized that drug treatment in the intensity has been shown to be a substitute for rest and collapse therapy.

The principal drugs now used in the treatment of pulmonary tuberculosis are isoniazid (INH), streptomycin or dihydrostreptomycin and amino glycolic acid (PAS). The simultaneous use of these drugs is probably justifiable for severely ill patients but in the more chronic forms of pulmonary tuberculosis no definite advantage has been shown. In general it is probably wise to withhold isoniazid or streptomycin preferably the latter if possible later in the course of treatment.

- 1 Isoniazid U S P (INH) (See page 133 for dosage) This is the most effective drug currently available. However when used alone its effectiveness is decreased by the early development of bacterial resistance. It should be used with at least one of the other drugs mentioned below.
 - a Indications Any active tuberculous lesion including primary tuberculosis in children. This drug has particular value in military tuberculosis, tuberculosis meningitis (see page 468), streptomycin resistant tuberculosis, and streptomycin intolerance.
 - b Toxicity Toxic reactions to isoniazid are infrequent in the usual dose of 5 mg/kg/day. They include dermatitis and fibrotic reactions. With larger doses peripheral neuropathy and rarely CNS irritability may occur. There is good evidence that the latter are related to pyridoxine depletion. Supplementary doses of pyridoxine (25-50 mg/day) should be given.

- 2 Streptomycin Sulfate U S P and Dihydrostreptomycin Sulfate U S P (See page 133 for dosage)
 - a Indication The indications for these drugs are the same as for isoniazid except that they are less effective than isoniazid in advanced tuberculosis. Likewise they are less effective when used alone and whenever possible should be given in combination with at least one of the other drugs.
 - b Toxicity Streptomycin and dihydrostreptomycin are essentially alike in the therapeutic effect. Since the toxicity of dihydrostreptomycin for the eighth nerve (deafness) is more than that of streptomycin (vertigo) the latter is more commonly used. Experience has shown that dividing the usual dose into equal parts of streptomycin and dihydrostreptomycin reduces the toxicity of both drugs. Toxic reactions to these drugs are few when given twice weekly. There is ample evidence that the regimen produces a therapeutic effect comparable to other streptomycin schedules (except in the more serious forms of the disease where daily dosage may be necessary). Generalized dermatitis occasionally occurs in patients who have the drug metabolized. Peroral administration is often preferable shortly after injection and may last for several hours. By itself it can be given.

- 3 Aminosalicylic Acid U S P (para-aminosalicylic acid PAS) (See page 133 for dosage)
 - a Indications This drug has a low level of activity but when used with streptomycin or isoniazid it delays the emergence of resistance.
 - b Toxicity Toxic reaction to PAS includes nausea, vomiting and diarrhea, a febrile reaction and occasionally general edema. The gastrointestinal symptoms may sometimes be overcome by gradual increase in the dose or by topping the drug for several days and then bringing it in small doses gradually increasing to the regular dose in 2-3 weeks. When used alone dermatitis due to PAS occurs though it is usually metabolized.
- 4 Viomycin Sulfate N N D (Vioactane® Vioform®) a 1

eff t ve and m e toxic d g ha limit d usefulness wher
hemoth rapy i n ded a d the abo ment o ed drugs
ca ot be us d The al dos 2 Gm I M d ily o twi
w ekly fo up to 8 weeks

- 5 Py in m de (py a noic ac d amid PZA) a drug which
oc lo lly p od eve toxic h patit s n b u ed
lon m with l i z d fo p r ds of 1 3 mo th when
i n hyper ensit vity to th other drugs i s snt
C ref l s ervat m for symptoms a d labor tory evidenc of
l dysfun tion m st be i d out and th d g t pp d
promptly if any bnorm lity appe rs The u al ad l t d e
is 0 75 Gm twi e daily
- 8 Cyclos ri e N N D (S omic e) The pl ce of this d g
the tr tment of tuberc lo is ha not yet been d te m ed

ANTI TUBERCULOSIS DRUGS

DRUG	ADULT DOSE		REMARKS
St ptomy in o Dihydrostr ptomycin	1 Gm daily o 1 Gm 2 times p r we k		Only ind t on f r sing thes d g s ungly is hyp se i t vity of th pati t or kr wn s ta e of b cell to oth r d ugs
Am o alacyl Acid (PAS)†	4 5 Gm t i d p c		
Iso azid (INH)	5 10 mg per Kg p d y		
Combin d Therapy	Co ti o s	Inter m ti t	Any tw of these th d g may be us d (x pt in v ed ase whe e all th e a e ind at d) U INH wh r possibl I v d s e s d ily t pt my in (t i imp ov m t is tabl h d th tw e w kly) and 10 mg per kg per d y (INH)
St ptomycin	1 Gm p day	1 Gm tw e w kly	
Am o alacyl Acid	4 Gm t d p (with th of abo e s b d le)		
Iso azid	5 10 mg p Kg p d y (with th of abo sched l s)		

Equal p rt of t eptomy in dihydrostr ptomy n (e g 0 5 Gm
f a h) a e l s t x th ith dr gal e

†F m ly par man alacyl cid M y n calc m or soda m
n l t m m e do g
In d vid d do

C Collapse Therapy Collapse therapy is often of benefit in the treatment of recent lesions (especially where cavitation is present) permitting earlier ambulation. Pneumoperitoneum is the principle method now used, having largely replaced pneumothorax because of the high incidence of irreversible pleural complications in the latter. Once instituted treatment should continue for 3-4 years for maximum effectiveness.

D Surgery

1. **Pulmonary resection** This has gained increasing popularity in the treatment of pulmonary tuberculosis in recent years although only about 15% of patients now being treated in tuberculosis hospitals require major surgery. The following indications are widely accepted:

- Localized nodule especially where diagnosis is in doubt
- Bronchiectasis causing positive sputum
- Bronchostenosis
- Thoracoplasty failure (Some of these can be successfully treated by resection)
- Any localized chronic focus which has not become inactive (National Tuberculosis Association 1955) after 12 months of adequate nonsurgical therapy

2. **Thoracoplasty** The current indications are decreasing in number and are as follows:

- Chronic cavity lesions where resection is not feasible and where the lesser procedure can be tolerated
- Certain cases where later resection is contemplated and it is felt that thoracoplasty will improve the patient's general condition
- To reduce the pleural dead space after a large pulmonary resection and thus minimize overdistention of remaining lung tissue
- To close chronic empyema spaces

E Diet A diet adequate in calories and high in proteins and vitamins should be employed. One should generally attempt to keep the tuberculous patient's weight above normal. No specific diets have been shown to be of benefit. If the patient is not eating and is losing weight, forced feedings by tube if necessary should be instituted.

F Climate There is little evidence that climate plays an important part in the management of tuberculosis. In the past heliotherapy or ultraviolet irradiation was widely recommended. There is no evidence that this therapy is of any value and it may be harmful in pulmonary tuberculosis. A mild sunburn or direct sunlight to the chest.

G Symptomatic Treatment Patient should be reassured that his symptoms will disappear as the illness subsides under control.

1. **Cough** In general cough in tuberculosis should not be suppressed by means of drugs. The non-productive cough serves no useful purpose and can generally be controlled voluntarily. If cough is productive the patient should be encouraged and instructed to cough properly (i.e. without initial violent inspiratory phase, the actual cough likewise should be without effort). It may become necessary at times to use medication to suppress a cough when it is exhausting to the patient. In these cases codeine 8-15 mg (1/8 to 1/4

g) or lly may be helpful. Bonyai has found that intramitochondrial fixation of 5-10% carbon dioxide with oxygen causes a diminution of the cough. Cases with large cavities and copious sputum may be helped by postural drainage.

- 2 Night sweat Efforts to control it should be directed at a good general and unnecessary bed clothing. Atropine 1/16 to 1/4 to 1/8 mg ($\frac{1}{4}$ to $\frac{1}{8}$ gr) orally may be tried at bedtime but if generally of little value.

- 3 Hemorrhage The chief danger of omphalorrhage tuberculosis is not a sudden death but a spirally of the infected blood and a danger of the disease to other parts of the lung. Therefore do not use cough inhibitors in the treatment of hemorrhage. *morphine sulfate should be avoided*.

Shock the apy should be initiated if bleedings severe and shock is imminent (see page 27).

- Respiration is most important in allaying apprehension. Phenobarbital sodium 50-120 mg (1-2 g) a day may be of value in quieting the apprehensive patient.

- d Collapse the apy. At times if severe bleeding continues collapse therapy may be combined with emergency measures but this is in the danger of causing spread of the disease. When severe bleedings continue Potassium Pituitary Injection U.S.P. 1 cc (10 IU) in 10 cc normal saline can be given SLOWLY I.V. (1 cc/min). Bleedings must stop promptly.

- f Nutrition if measures. Absolute bed rest is essential. The value of position is controversial but complete immobilization usually. Monitoring from time to time. High liquid diet. Instruct patient in proper method of coughing (see above).

Prophylaxis

- A Indications All necessary precautions must be taken when a case is found on a patient.

- B BCG Immunization Although extensive studies are still in progress the value of active immunization of the general population with BCG vaccine is not definitely established after many years. Until further reliable results from immunization studies are not considered except for individual with a high risk of infection in whom the risk of infection is great (i.e. medical students, etc.).

- C Treatment of Household Contacts Most authorities now recommend the treatment of certain individual known to have been closely (within the preceding 6 months) infected by a tuberculous person. The identification of the disease in the contact is a positive tuberculin reaction to a patient. Children up to age 3 should routinely receive a course of drug treatment (see below) when a positive tuberculin reaction is found. It is in this group that the most serious complication of tuberculosis is most likely to occur. Some advocate the treatment of contact tuberculosis on a prophylactic basis.

The present treatment consists of a course of drugs therapy with isoniazid 5 mg/Kg/day should be continued together with pyrazinamide 15 mg/Kg/day for 3-12 months. When PAS is not tolerated at a dose of 20 mg/Kg twice weekly may be substituted.

LUNG ABSCESS (code No 360 100 2)

The etiology of lung abscess should be determined in all cases before therapy is instituted because the underlying process may be as important as the abscess and may modify the course and treatment. About 25% of the cases follow oropharyngeal surgery. Causes of the remainder include pneumonia, aspiration of foreign body, bronchogenic carcinoma or other bronchial obstruction, bronchiectasis, and emboli.

Diagnosis

A History

- 1 **Acute lung abscess** Usually follows oropharyngeal surgery, pneumonia, or other systemic or local infections. There may be a latent period, especially post-surgical, followed by rapid development of cough, malaise, chills, and fever and pleurisy with or without effusion. Patient becomes very toxic and breath becomes foul. Several days later patient may suddenly cough up a large amount of pus, and at this stage the diagnosis is certain.
- 2 **Chronic abscess** The manifestations vary with extent and location of the abscess. There is generally low-grade fever, cough with copious sputum, pleurisy, and weight loss. Chronic lung abscess usually occurs secondary to bronchiectasis or bronchial obstruction.

B Physical Examination Findings vary with the size, position, and contents of the cavity and local pulmonary reaction.

C Laboratory Findings

- 1 Hematological examination usually typical of severe infection.
- 2 Chest x-ray may show cavitation with a fluid level and surrounding pneumonia.

D Bronchoscopy This is an important diagnostic procedure inasmuch as an obstructive lesion or foreign body in the bronchus may be found.

Treatment

A Specific Measures

- 1 **Acute abscess** Begin antibiotic agents early to prevent destruction of lung tissue. Make smear and culture of sputum to determine predominant organism and employ the appropriate antibacterial agents in very high doses (see table on page 514). If patient fails to respond, surgery is indicated without delay.
- 2 **Chronic abscess** Although some few chronic cases will get well on a medical regimen as outlined above for acute abscess, therapy with antibiotic agents is used to decrease infection in preparation for surgery.

B General Measures

- 1 Supportive and symptomatic care.
- 2 Postural drainage is very important to prevent accumulation of material (see page 121).
- 3 Do not depress the cough reflex by use of sedative cough medicines.
- 4 Bronchoscopy is usually indicated to promote drainage.

C Follow up The patient cannot be considered cured until there

has been complicated by x-ray Serial x-rays
required in this follow up which may take many weeks

NEOPLASMS OF THE LUNGS BRONCHOGENIC CARCINOMA (code No 350 8) (Epidermoid code No 350 814)

Neoplasms of the lung form a very important group of the malignancies. The most static tumors are the most common but the primary neoplasms are of great interest in diagnosis and therapy. The primary tumors usually arise from the bronchus and spread into the lung field. They are rarely diagnosed early because of the insidious onset and tend to mimic other pulmonary diseases. Clinically, though, the common presenting symptom is asthma, progressive dyspnea, cough, hemoptysis, and weight loss. Consolidation of the lung is a common feature and a pleural effusion may occur. It must always be considered in the diagnosis of any acute or chronic pulmonary disease, especially in males over 50 years of age. Bronchoscopy and examination of sputum for cancer cells are important diagnostic studies.

Treatment

- A Surgery: The treatment of choice when the lesion is discovered early.
- B Supportive and symptomatic measures if the cases in which surgery cannot be performed.

PULMONARY ATELECTASIS (Compression code No 362 435) (Postoperative code No 362-415 4)

Atelectasis is due to obstruction of the bronchus with collapse of the lung and collapse of the lung distal to the obstruction. Most cases follow surgery and tend to occur in the right lower lobe. The condition usually is manifested 4 days after surgery and the findings are those of pneumonia and collapse of the involved areas. If immediate treatment is not started out, a secondary bacterial infection can develop and a pneumonia develops.

Treatment

- A Postoperative Atelectasis
 - 1 For prevention of hypoxia, the volume of air by use of a mixture of 85% O_2 and 15% CO_2 administered by mask for several minutes every 3 hours. This is also good for the patient.
 - 2 Bronchodilation by low intermittent positive pressure (Bennett valve) has been demonstrated to be most effective. For postoperative atelectasis, the pressure should be 10 to 30 mm Hg every 2-3 hours for 24 hours before discharge, that the mechanical ventilation should be continued until the patient is able to breathe without the aid of the apparatus. The nasopharynx should be irrigated with the aid of a syringe or of a catheter.
- 3 Aspiration of the secretions. If it is with the aid of the patient should be performed through the nasopharynx with the aid of a syringe or of a catheter.

LUNG ABSCESS (code No 380 100 2)

The etiology of lung abscess should be determined in all cases before therapy is instituted because the underlying process may be as important as the abscess and may modify the course and treatment. About 25% of the cases follow oropharyngeal surgery. Causes of the remainder include pneumonia, aspiration of foreign body, bronchogenic carcinoma or other bronchial obstruction, bronchiectasis, and emboli.

Diagnosis

A History

1. **Acute lung abscess** Usually follows oropharyngeal surgery, pneumonia, or other systemic or local infections. There may be a latent period, especially post-surgical, followed by rapid development of cough, malaise, chills, and fever and pleurisy with or without effusion. Patient becomes very toxic and breath becomes foul. Several days later patient may suddenly cough up a large amount of pus, and at this stage the diagnosis is certain.
2. **Chronic abscess** The manifestations vary with extent and location of the abscess. There is generally low grade fever, cough with copious sputum, pleurisy, and weight loss. Chronic lung abscess usually occurs secondary to bronchiectasis or bronchial obstruction.

III Physical Examination Findings vary with the size, position, contents of the cavity, and local pulmonary reaction.

C Laboratory Findings

1. **Histomorphological examination** usually typical of a vesicular infection.
2. **Chest x-ray** may show cavitation with a fluid level and surrounding pneumonia.

D Bronchoscopy This is an important diagnostic procedure inasmuch as an obstructive lesion or foreign body in the bronchus may be found.

Treatment

A Specific Measures

1. **Acute abscess** Begin antibacterial agents early to prevent destruction of lung tissue. Make smear and culture of sputum to determine predominant organism, and employ the appropriate antibacterial agent or agents in very high doses (see table on page 514). If patient fails to respond, surgery is indicated without delay.
2. **Chronic cases** Although some few chronic cases will get well on a medical regimen as outlined above for acute abscesses, therapy with antibiotic agent is used to decrease infection in preparation for surgery.

B General Measures

1. **Supportive and symptomatic care**
2. **Postural drainage** is very important to prevent accumulation of material (see page 121).
3. **Do not depress the cough reflex by use of sedative cough medicines.**
4. **Bronchoscopy** is usually indicated to promote drainage.

C Follow up The patient cannot be considered cured until the

respiratory distress. Although it is occasionally beneficial, the disadvantage of increasing total alkalosis. The usual dose is 250 mg (4 g) twice daily.

PULMONARY INFARCTION

(Due to Thrombus code No 360 511)

(Due to Embolus code No 360 512)

Pulmonary infarction due to an embolus thrombus occluding a branch of the pulmonary artery. A wedge-shaped area of lung tissue distal to the occlusion becomes infarcted with blood which extravasates into interstitial and pulmonary tissue.

Diagnosis

The signs and symptoms vary with the size of the blood vessel occluded. If the infarct is small there may be no manifestations. If large the most common findings are hemoptysis, chest pain (usually pleuritic), and dyspnea. If massive enough there may be right heart failure and death. If patient survives moderate or severe infarction dyspnea, chest pain, pleurisy with or without effusion and fever become prominent. ECG evidence of right heart strain may be a very early finding. Leukocytosis and increased sedimentation rate persist until the infarction has healed. X-ray of the chest may show wedge-shaped areas of consolidation.

Treatment

When a patient has a pulmonary embolus suspected without thrombosis and institute immediate therapy for the thrombosis (see page 215).

A Emergency Measures

- 1 Oxygen in high concentration preferably 100% (by mask) to overcome hypoxia. This helps prevent cardiorespiratory failure.
- 2 Propofol 30-60 mg (1/2-1 gr) and atropine 1-2 mg (1/60-1/30 gr) I.V. slowly and repeat every 3-4 hours. This helps overcome the general pulmonary arteriolar spasm that occurs.
- 3 Morphine sulfate 8-15 mg (1/8-1/4 g) or Meperidine Hydrochloride U.S.P. (Demerol®) 50-100 mg (3/4-1 1/2 g) subcutaneous or I.V. to help control pain.
- 4 If shock persists I.V. fluid should be used with great caution because of possibility of precipitating acute right heart failure.
- 5 If acute right heart failure develops venesection should be performed (see page 185).

B Follow-up Treatment

- 1 Observe carefully for evidence of infection and institute antibiotic treatment promptly if indicated.
- 2 Thoracentesis. If pleural effusion occurs and embolus respiration moves by patient.

Prophylaxis

The prophylaxis of pulmonary infarction consists of the treatment of five causes of thrombosis (see page 217).

138 Pulmonary Emphysema

- 4 If the above fail aspiration of mucus by bronchoscopy is indicated
- 5 Antibiotic therapy Penicillin complex 300 000 units b.i.d.

B Spontaneous Atelectasis Bronchoscopy to determine the nature of the obstruction and then institute appropriate treatment

PULMONARY EMPHYSEMA

(Due to Unknown Cause code No 362 9x6)

(Postural code No 362-434)

Pulmonary emphysema is a disease usually found in older individuals and those suffering from chronic bronchial asthma. There is progressive distention of the pulmonary alveoli with subsequent rupture of the interalveolar membranes and replacement of the alveoli by larger poorly functioning air sacs.

The diagnosis is generally not difficult. The chief complaint is dyspnea. The anterior-posterior diameter of the chest is generally enlarged. The lung fields are hyperresonant and breath sounds coarse. Pulmonary emphysema must be differentiated from dyspnea due to congestive failure.

Treatment

A Specific Measures Since many patients have an associated chronic bronchitis with some elements of asthma therapy is generally similar to that outlined for chronic bronchitis or chronic bronchial asthma (see page 116).

- 1 Spasmolytic agents to relieve bronchial spasm. Epinephrin by inhalation, ephedrine etc (see page 118).
- 2 Eradicate any infection. Penicillin or tetracycline aerosols (see page 153).

B General Measures

- 1 Inhalation of 100% oxygen is indicated for 20-30 minutes helps relieve dyspnea and appears to reduce spasm. Recently the use of intermittent positive pressure respiration in some cases with bronchial dilators has been shown to be of considerable value. Oxygen must be used with caution in cases with long-standing anoxia since use of 100% oxygen has caused coma and even death in some patients (see page 144).
- 2 Maintain mechanical efficiency of diaphragm at its optimum.
 - a Abdominal bracing. Obese patients or those with a poor abdominal musculature should wear an abdominal belt during the day (e.g. Kerr-Laguard belt).
 - b Manual relief of overdistention of lungs. The palms of both hands are placed under the anterior ribs and pushed inwards and upwards during end of expiration. This is repeated 10-15 times 2-3 times daily. Patients often claim their dyspnea is relieved for hours by this maneuver.
 - c Therapeutic pleuroperitoneum can be employed in selected patients to mobilize the diaphragm.
- 3 Acetazolamide (N.D. Diamox®) a bicarbonate anhydrase inhibitor has been used to reduce the bicarbonate content and the arterial pCO_2 in patients with CO_2 retention and

asparaginase. Although it is occasionally beneficial, the disadvantage of increasing total acid is. The usual dose is 250 mg (4 gr) twice daily.

PULMONARY INFARCTION

(Due to Thrombus code No 360 511)

(Due to Embolus code No 360 512)

Pulmonary infarction is due to an embolus or thrombus occluding a branch of the pulmonary artery. A wedge-shaped area of lung is distal to the occlusion, becoming infarcted with blood which extravasates into cells and pulmonary tissue.

Diagnosis

The signs and symptoms vary with the size of the blood vessel occluded. If the infarct is small there may be no manifestations. If large, the most common findings are hemoptysis, chest pain (usually pleuritic), and dyspnea. If more severe, there may be right heart failure and death. If the patient survives, moderate or severe infarction, dyspnea, chest pain, pleurisy with or without effusion, and fever become prominent. For example, evidence of right heart strain may be a very early finding. Leukocytosis and increased sedimentation rate precede the infarct. A chest X-ray of the chest may show a wedge-shaped area of consolidation.

Treatment

When a patient has a pulmonary embolus, suspect venous thrombosis and institute heparin distal to the pyelothrombosis (see page 215).

A Emergency Measures

- 1 Oxygen in high concentration preferably 100% (by mask) to overcome anoxia. This will help prevent a diaphragmatic spasm.
- 2 Morphine 30-60 mg ($\frac{1}{2}$ to 1 gr) and atropine 1-2 mg ($\frac{1}{80}$ to $\frac{1}{30}$ gr) I.V. slowly and cautiously every 3-4 hours. This helps venous thrombosis, general pulmonary arteriolar spasm, that occurs.
- 3 Morphine sulfate 8-15 mg ($\frac{1}{8}$ to $\frac{1}{4}$ gr) or Meperidine Hydrochloride U.S.P. (Demerol®) 50-100 mg ($\frac{3}{4}$ to 1½ g) by I.V. to help control pain.
- 4 If shock is present, I.V. fluids should be used with great caution because of possibility of precipitating acute right heart failure.
- 5 If subsequent right heart failure develops, ventilation should be performed (see page 185).

B Follow up Treatment

- 1 Observe reflexively each day, note a distal tibial fracture, tip empty if a gas occurs.
- 2 The acetabulum. If pleural effusion is and mba ras e expiration move by passive.

Prophylaxis

The prophylaxis of pulmonary infarction consists of the treatment of venous thrombosis (see page 217).

DISEASES OF THE PLEURA AND PLEURAL SPACES

ACUTE FIBRINOUS PLEURISY (WITHOUT EFFUSION)
(code No 370 100 4)

Fibrinous pleurisy is most often secondary to an underlying pulmonary disease. Whenever no apparent primary disease is present always consider tuberculosis. About 30-40% of cases of so-called primary pleurisy actually re-tuberculous. A large number of these patients develop active pulmonary tuberculosis within a 5 year period.

Diagnosis

Acute fibrinous pleurisy can usually be diagnosed mainly from history of pain in the side of the chest aggravated by respiration. The pain may be felt in the shoulder or referred to neck or abdomen in diaphragmatic pleurisy. There may be other symptoms depending on the underlying disease. The signs vary depending on the extent and nature of the lesion. Many cases have a pleural friction rub but this may be absent.

Treatment

Treatment is aimed at the underlying disease. The treatment of the pleurisy is entirely symptomatic and aimed at relieving the pain.

- A Analgesics. May be used as necessary (see page 32)
- B Ethyl chloride spray as local anesthetic is of value (see page 128)
- C Strapping of chest with adhesive tape may afford relief by restricting movement.
- D Procain hydrochloride intracostal block may be used in more severe cases.

ACUTE FIBRINOUS PLEURISY (WITH EFFUSION)
(code No 370 100 8)

Most cases of pleurisy with effusion are secondary to pulmonary disease. However there are a small number that are primary in the pleura (histoplasmosis, mycoplasma, or infection). Whenever sterile pleural effusion is discovered without obvious cause consider it tuberculous until proved otherwise.

Diagnosis

The diagnosis is usually relatively simple when one makes use of physical diagnosis and x-ray examinations. However at times it may be impossible by these means to distinguish between fluid and thickened pleura. The latter can only be differentiated by performing a diagnostic thoracentesis.

If fluid is discovered in the pleural space ascertain its nature and the presence of infecting organisms.

A Removal of Fluid for Examination

- 1 Remove 50-500 cc. Use a two-way tapcock to avoid introduction of air.

2 Inj t 50 000 100 000 units f p nicillin in 10 cc s lin i to
th pl u l sp c th ough the sam n dls This is fo e ther
p phyl x or actu l the apy

B Pl u l F l i d E m t on

- 1 Gr s am not on Take sp cific grav ty to d te mine if
ud t o i ns dat
- 2 Sm a and stan f r d tect on of organ sm and n t e of
eli lar cntent C lls t a specim n in an ant m gul nt f r
ll ount
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B C l M

- 1 B d t indicated as for m l sm l p l m n ry t be ul i
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C Follow up T tment C eful follow up fo a 5 y a p i od is
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EMPTYEMA (code No 370 100)

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DISEASES OF THE PLEURA AND PLEURAL SPACES

ACUTE FIBRINOUS PLEURISY (WITHOUT EFFUSION)
(code No 370 100 4)

Fibrinous pleurisy is most often secondary to an underlying pulmonary disease. Whenever no apparent primary disease is present always consider tuberculosis. About 30-40% of cases of so-called primary pleurisy actually are tuberculous. In a large number of these patients develop active pulmonary tuberculosis within a 5 year period.

Diagnosis

Acute fibrinous pleurisy can usually be diagnosed merely from history of pain in the side of the chest aggravated by respiration. The pain may be felt in the shoulder or referred to neck or abdomen in diaphragmatic pleurisy. There may be other symptoms depending on the underlying disease. The signs vary depending on the extent and nature of the lesion. Many cases have pleuritic friction rub but this may be absent.

Treatment

Treatment is aimed at the underlying disease. The treatment of the pleurisy is entirely symptomatic and aimed at relieving the pain.

- A Analgesic. May be used as necessary (page 32)
- B Ethyl chloride spray as local anesthetic of value (see page 126)
- C Strapping of chest with adhesive tape may afford relief by restricting movement
- D Procaine hydrochloride intercostal block may be used in more severe cases

ACUTE FIBRINOUS PLEURISY (WITH EFFUSION)
(code No 370 100 8)

Most cases of pleurisy with effusion are secondary to pulmonary disease. However there are a small number that are primary in the pleura (e.g. hemogenous implantation infection). Whenever sterile pleural effusion is discovered without obvious cause consider it tuberculous until proved otherwise.

Diagnosis

The diagnosis is usually relatively simple when one makes use of physical diagnosis and x-ray examinations. However at times it may be impossible by these means to distinguish between fluid and thickened pleura. These can only be differentiated by performing a diagnostic thoracentesis.

If fluid is discovered in the pleural space treat it in its nature and the presence of infecting organism.

A Removal of Fluid by Examination

- 1 Remove 50-500 cc. Use a two-way stopcock attached into the tube of the

SPONTANEOUS PNEUMOTHORAX (code No 306 900 5)

Spontaneous pneumothorax usually is caused by rupture of an apophysomatous bleb when a und lying lung disease is present. It is also one of the complications of tuberculosis. Always investigate if tuberculosis is in a case of spontaneous pneumothorax.

Treatment

A Bed rest until it has been largely reabsorbed. If tuberculosis is present treat accordingly.

B Symptoms indicate treatment as indicated.

1 Pleural pain should be treated with analgesic (e.g. aspirin) or thylchloride spray (e.g. pag 126).

2 Cough. If there is no underlying pneumonia and cough is annoying, codeine 0.015-0.06 Gm (1/4-1 gr) every 3-4 hours should be used.

3 Aspiration of symptoms severe. If pneumothorax continues to reaccumulate, then an underlying disease should be treated (see below) may be necessary.

4 Administer oxygen if dyspnea is present.

C Surgery. In some cases of spontaneous pneumothorax when the lung does not expand or when there is a repeated pleural effusion, pleurotomy or thoracotomy may be necessary.

TENSION PNEUMOTHORAX

(From Lung, code No 306 400 4)

(From Chest Wall, code No 377-400 4)

This is a medical emergency. There is a valve-like action of the pleura which causes either the lung or the chest wall to collapse into the pleural space from the outside of the lung during inspiration and cannot pass during expiration. Unless treated immediately death may result.

Treatment

A Emergency Treatment

1 Perform a sharp incision in the anterior part of the affected chest in the third intercostal space to the pleural space. To treat the expanding lung. The end of a rubber glove finger slit at the tip may be tied over the hole of the needle to act as a simple one-way valve. As soon as possible connect the needle to a rubber tubing and place the other end of the tube under 1-2 cm of water in a suitable container. As soon as feasible a rubber catheter is introduced into the pleural space by means of a trocar and substituted for the incision.

2 If pain is severe give morphine 5-15 mg (1/8-1/4 g) i.v. r.i.m. immediately.

3 Test for klop (e.g. pag 27).

B Follow up Treatment. As for spontaneous pneumothorax (see above).

142 Pneumothorax

Treatment

- A Specific Measures Systemic administration in high dosage of appropriate chemotherapeutic or antibiotic agent as determined by examination of infecting organism. Treatment should be continued for 10 to 14 days after patient is afebrile or fluid has become sterile (see pag 514)
- B Daily thoracentesis should be performed removing as much of the purulent material as possible. Frequent physical examination of the chest with x rays must be done to avoid overlooking any loculated areas (pockets) of purulent material.
- 1 Irrigate empyema cavity with 500-2000 cc saline
 - 2 Instill 100 000-200 000 units of penicillin and 5-10 Gm of streptomycin in 10 cc into the cavity at the completion of the irrigations. Continue daily until fluid in cavity has been sterile for 10-14 days or until fluid can no longer be obtained.
 - 3 Various enzymatic agents have recently been prepared which digest the protein material especially the fibrin that forms in this condition. These are also introduced directly into the thoracic cavity. The principles available are trypsin (Trypsinase) and streptokinase streptodornase (Verdase). Trypsin acts by digesting all nonliving protein material. The streptokinase streptodornase attacks mainly fibrin.
- C Surgical drainage is necessary if patient does not improve in a few days or if pus becomes too thick to aspirate with a needle.

HYDROTHORAX (code No 370 522)

Hydrothorax is most generally due to congestive cardiac failure. Treatment is directed at the failure itself. In cases of respiratory embarrassment removal of the fluid is necessary.

HEMOTHORAX (code No 370 532)

Hemothorax is most commonly due to trauma. World War II experience has shown that pleurocentesis and irrigation of the blood from the pleural cavity is the treatment of choice. Repeated aspirations are performed as necessary. If bleeding continues thorotomy is indicated. Grate are most beneficial in these cases to avoid possible bacterial contamination of the pleural cavity. The proteolytic enzyme (see above) may be self-limited bleeding stopped. Surgical removal of residual blood clot may be necessary.

PNEUMOTHORAX

Air in the pleural space can occur as a result of air entering through an opening in the chest wall (i.e. by a traumatic pneumothorax or trauma) or as a result of air entering from inside the lung.

SPONTANEOUS PNEUMOTHORAX (code No 306 900 ■)

Spontaneous pneumothorax usually is caused by rupture of an emphysematous bleb when no underlying lung disease is present. It is less one of the complications of tuberculosis. Always investigate for tuberculosis in any case of spontaneous pneumothorax.

Treatment

A Breathe until a rash has been largely resolved. If tuberculosis is present, treat accordingly.

■ Symptomatic treatment as indicated

1. Pleuripain should be treated with an analgesic at asprap or ethylhydrazide (see page 126).

2. Cough. If there is a sound lung pneumonia and cough is annoying, codeine 0.015 mg/kg (1/4 gr) every 3-4 hours should be used.

3. Aspiration of symptoms as necessary. If pneumothorax on tension, remove accumulated air by needle or chest tube. If the patient is not breathing, give oxygen.

4. Administer oxygen if dyspnea persists.

■ Surgery. In cases of spontaneous pneumothorax where the lung does not expand where there are reported patches of cell proliferation to the thorax of myomycin is necessary.

TENSION PNEUMOTHORAX

(From Lung, code No 306-400 4)

(From Chest Wall, code No 377-400 4)

This is a medical emergency. This results from a valve-like action of the pleural surface of the right lung on the chest. Air is sucked into the pleural space from the outside or from the lungs during inspiration and cannot escape during expiration. Until a strict diaphragm is destroyed, the result is fatal.

Treatment

A Emergency Treatment

1. Pleural space should be closed into the anterior part of the affected hemithorax by needle; aspirate the pleural space. Avoid insertion into the expanding lung. The end of a rubber glove finger, slit at the tip, may be inserted over the hub and if the needle is a sample on the valve. As soon as possible connect the needle to a rubber tubing and place the other end of the tube under 1-2 m of water in a stable container. As soon as a flexible rubber sheath is introduced into the pleural space by means of a trocar, should be substituted for the lying needle.

2. If pain is severe, give morphine sulfate 15 mg (1/2-1/4 g) i.v. or i.m. immediately.

3. Treat shock if present (see page 27).

B Follow-up Treatment. As for spontaneous pneumothorax (see page 126).

TRAUMATIC PNEUMOTHORAX (code No 377-400 3)

This is an emergency. Large open chest wounds (i.e. sucking wounds) are the most severe. The opening must be made airtight by any available means i.e. bandage handkerchief shirt or other material and closed surgically as soon as possible.

CORRECTION OF HYPOXIA AND OXYGEN THERAPY

Oxygen therapy consists of the administration of oxygen at concentrations greater than are found in the atmosphere. Increased concentrations are indicated only when hypoxia exists. The correction of hypoxia does not always require oxygen therapy. In fact in some cases of hypoxia oxygen therapy may be dangerous if not administered properly.

Oxygen therapy is always palliative. It is generally used to tide the patient over an emergency situation while the underlying cause is being corrected. Correction may not always be possible. When verbal respiration ceases, resuscitation must be instituted.

A classification of the most common causes of hypoxia and methods for their correction are found in the chart on page 146.

Dangers of Oxygen Therapy

Although much has been written about the dangers of oxygen therapy, the principal danger appears to be depression of respiration in severely hypoxic patients who have an elevation of CO_2 tension in the blood. In these individuals the respiratory center in the medulla has been anesthetized by the high CO_2 tension and respiration is under control of the chemoreceptor center responsive to oxygen tension. Therefore when high concentrations of oxygen are given the chemoreceptor center ceases to give a stimulating response and there is a resultant decrease in pulmonary ventilation which may cause enough CO_2 retention to produce narcosis, unconsciousness and even death. This usually occurs within a few minutes after starting high concentrations of oxygen but may occur even up to 12 hours after instituting treatment. Therefore no patient should be given oxygen unless he is under close observation during the first 30 minutes of oxygen administration and hypotension with suspected elevation of CO_2 tension should have a nurse in constant attendance and if possible some method of mechanical ventilation should be kept available.

Treatment of Hypoxia Associated With CO_2 Retention

This situation may be managed in one of two ways:

1. Oxygen may be administered by means of a non-rebreathing mechanical respirator or a self-inflating body respirator (Bennett apparatus) cyclically or automatically (by an attendant). This is the more effective method because it promotes adequate ventilation; the CO_2 is removed more rapidly.
2. If high concentrations are not needed immediately, reduce oxygen concentration in room as slowly as CO_2 is removed.

Oxygen Toxicity

Although much has been written about oxygen toxicity, there appears to be little evidence of its clinical occurrence. Many of

reported incidence of oxygen toxicity have been cases of irritation resulting from improperly humidified oxygen

TECHNIC OF ADMINISTRATION

When oxygen therapy is used proper humidification even aerosolized water or saline must be maintained

OXYGEN AT ATMOSPHERIC PRESSURE

Oxygen is most commonly administered at atmospheric pressure. It is indicated when hypoxia can be controlled adequately by the means alone. For indications see page 146.

Various methods of administering oxygen at atmospheric pressure are in use. Below are tabulated those methods which are most commonly used with adults and the oxygen concentrations which can be achieved.

Method	Usual Oxygen Concentration	Usual Rate of Oxygen Flow (L./min.)
Tent	40-50%	Flow 15-30 Maintain at 12-15
Catheter		
a Nasopharyngeal (metallo rubber)	20-40%	6-8
b Oropharyngeal	30-40%	6-8
Mask		
a BLB non equivalent	80-100%	8-10
b Expendable plastic mask	40-60%	10-15
c OEM or Bennett face mask	80-100%	6-8

Oxygen Tent

A Advantages

- 1 Give moderate concentrations of oxygen at maximum comfort to the patient
- 2 Can be used with ill and uncooperative patient

B Disadvantages

- 1 Must be open to the air and to operate at
- 2 Cannot achieve high concentrations of oxygen
- 3 If not opened properly oxygen concentration may rise and carbon dioxide is likely to accumulate

Nasal Catheter

This apparatus consists of a cannula (French No. 10-12) with 4-6 small holes in the terminal inch and a reduction valve mechanism and a humidifier bottle. A suitable plastic or metal anula which extends about 1 inch into the nasal cavity.

A Technique

- 1 The catheter should be lubricated with petroleum jelly and placed in the nostril 5-12 hours

HYPOXIA COMMON CAUSES AND METHODS OF CORRECTION

Physiologi- cal Classification	Clinical Condition	Treatment
Hypoxia With Normal Lungs Deficient atmospheric oxygen	High altitude flying	Oxygen at atmospheric pressure
Altitude sickness	Cyanosis (tongue) For ignobles Atelctasis mucous Paralysis of respiratory system glossitis mucositis	Rest Clear the airway Oxygen usually needed Respirator
Paralysis of respiratory system	Anthrax Pneumonia	Respirator
Paralysis of respiratory system	Edema of lungs Pneumothorax	Respirator

Hypoxia With Abnormal Lungs Diminished number of functioning alveoli	Pneumonia	Oxygen at atmospheric pressure
	Emphysema Asthma	Oxygen by inhalant possible atmospheric pressure
Improper mechanism of penetration of inspired gas	Emphysema Bronchial asthma	Oxygen by inhalant possible
Inspired gas not as pure as atmospheric	Pulmonary edema	Oxygen by inhalant possible (in an emergency possible)
Venous Arterial Shunt	Congenital heart disease	Oxygen is helpful if available

Hypoxia Due to Inadequate Oxygen Transport by Blood	Oxygen Transport by Blood	
Diminished circulation	Anemia	Circulation
	CO poisoning	Oxygen at atmospheric pressure
	High hemoglobin	Adequate CO in blood or blood
Impaired circulation	Congestive heart failure Pulmonary edema	Oxygen at atmospheric pressure If pulmonary edema possible
	Shock	Oxygen at atmospheric pressure possible and if possible to the only possible in the

Hypoxia Due to Impaired Oxygenation	Oxygenation	
	Circulation Pneumonia Sclerosis	Respiration Oxygen Appropriate (if possible) (page 538-540)

- 2 It may be placed in the nasopharynx or inserted into the nostril but concentration is usually only about 25-30%
 - 3 Place in oropharynx for concentrations up to 40%. To calculate the approximate distance the tube must be inserted, measure the distance from the external nares to the tip of one ear lobe using the tube to measure with. Then pass the tube through the nose into the oropharynx. When the patient begins to swallow withdraw the tube about $\frac{1}{2}$ in and secure it in position.
 - 4 The binasal cannula gives concentrations about the same achieved with the single oropharyngeal catheter.
- Advantages** The nasal catheter is the cheapest method of administering oxygen and is more comfortable than a mask.
- Disadvantages** Very high concentrations of oxygen are not obtainable and mucosa may dry with ordinary humidification.

Masks

A Apparatus

- 1 BLB masks. Nasal or oronasal rebreathing mask with rebreathing bag. The disadvantage of this mask is that with low flow of oxygen (under 6 l/min) CO_2 tends to accumulate. The eye may also be resistant to inspiration from flat rebreathing bag.
- Expended plastic masks. Require high oxygen flow. Low oxygen concentration is achieved.
- 3 OEM and Bennett face masks. Similar to BLB mask but do not permit rebreathing but use a flutter type valve so rebreathing of CO_2 is not possible.

B Advantages of Mask

- 1 High FIO_2 ratio of oxygen obtainable without the use of pump (except for plastic masks).
- 2 Both OEM and Bennett masks have inlet settings so that oxygen concentration can be varied from 50 to 100%.

C Disadvantages Tight fitting masks cannot be tolerated by some patients.

OXYGEN UNDER PRESSURE

Various positive pressure breathing devices have been developed which allow oxygen to be administered under slight positive pressure during the inspiratory phase. Although originally the devices were employed for resuscitation (usually with a positive pressure phase in expiration) the value of intermittent positive pressure in the treatment of various acute and chronic pulmonary and cardiac conditions was soon recognized.

Physiological Effect

The principal physiological effect of oxygen administered by pressure method are as follows:

- 1 It helps overcome resistance to gas flow and widens the bronchioles permitting more efficient cough and bronchial drainage.
- 2 In respiration pulmonary mixing creating more uniform alveolar ventilation.

- 3 Decreases residual volume
- 4 Inhibits fluid extravasation into the alveoli (helps of aid in pulmonary edema)
- 5 Interferes with venous return to the right heart with consequent decrease in cardiac output and blood supply to the lungs. This latter phenomenon is of value in management of congestive failure especially with associated pulmonary edema. In shock on the other hand it is a disadvantage and often contraindicates the use of positive pressure devices in this condition.

PRINCIPAL METHODS OF POSITIVE PRESSURE BREATHING

Method	Pressures During Respiration	Indications and Uses	Remarks
Mouth to mouth or mouth to endotracheal tube	Positive pressure in inspiration	Resuscitation especially useful with children and newborn infants	Most primitive method of positive pressure but may be very effective. Oxygen administration at lower than atmospheric concentrations.
Bennett positive pressure therapy unit (motor or oxygen powered)	Positive pressure in inspiration. May use oxygen, air or oxygen-helium mixture.	Mainly for therapy of chronic pulmonary diseases. Also useful in pulmonary edema.	Interferes with venous return to right heart so contraindicated in forward failure. Especially useful in hypoxia due to improper mixing of gases and for pushing oxygen across impaired membranes (see page 143).
Oxygen injector mask (Barach) metered for positive pressure	Positive pressure in expiration. Used with oxygen.	Advocated for pulmonary edema.	Least efficient. Positive pressure applied at wrong place in respiratory cycle to be of benefit. Also very tiring to breathe against resistance.
Commercial resuscitators of the suck and blow type: Stephenson, Emerson, E and J, etc.	Positive pressure in inspiration and negative pressure in expiration. Generally employs oxygen.	Resuscitation.	Most effective means of resuscitation. Let interfere with cardiovascular dynamics although the usual pressure relationship in inspiration and expiration is reversed. Negative phase may cause pulmonary edema in predisposing condition.
Kreiselman hand bellows or Emerson bellows	Positive pressure in inspiration.	Resuscitation.	Inexpensive resuscitator useful mainly when more expensive apparatus is not available.

Bennett Positive Pressure Therapy Unit

The Bennett unit is an oxygen self-inflating device available for use with the Nebulizer or with the Mist-O-Graph nebulizer for good humidification (as for administration of various antibiotics, vasodilators and sedatives) lowering gasses. It is particularly useful for administration of surfactant to the newborn. The terminal bronchioles and alveoli. Excellent instructions are supplied with the unit. A pop-alappatus also indicates that cylinders are full. Clinical indication and use as follows:

1. Bronchitis. Especially with bronchodilator use.
2. Chronic emphysema. Idiopathic or accompanying fibrosis. Pulmonary edema. Stress it apparently when bronchodilators are used. Must be used cautiously with untreated hypoxia and elevated CO_2 tension. (See dangers of oxygen therapy page 144.) In the condition therapy must be employed 24 hours a day for about 20 minutes per hour. The time to give in cases of 3-20 days when the patient is dehydrated.
3. Bronchitis. A form of emphysema. Antibiotics by oral or intravenous route.
4. Pulmonary edema. Especially if the patient is associated with a heart failure. Must be used with great caution if shock (irreversible) is present.
5. Irritating gases and fumes. Very soluble especially with any type of pulmonary edema. Useful in lungs have been used.
6. Atelectasis. See page 137.
7. Respiratory distress. Must be used with caution if pulmonary failure is present.
8. Right heart failure. Helps in hypoxia. Right heart failure. Right heart. Excellent in managing most forms of right heart failure in conjunction with the master (see page 181).

Caution

The Bennett apparatus must be used with great caution in all cases of peripheral artery disease or shock (irreversible).

MAINTENANCE OF RESPIRATION BY ALTERATIONS OF CHEST WALL PRESSURES

Although failure of ventilation may be caused by passive changes in peripheral pressure, the method is not always directly available. The principle of the lung pressure in the chest wall. When the method is employed the normal tidal pressure is established. The method is referred to as the "Bennett" method. The following page

PRINCIPAL METHODS OF PRESSURE ALTERATIONS TO THE CHEST WALL

Method	Pressures During Respiration	Indications and Uses	Remarks
Artificial respiration	The best method to use is to pull on arms to expand chest for inspiration pressure for expiration (see below)	All respiratory failures when no other method is available	Entirely physiological when proper method is used (see page 151)
Body respirator	Negative pressure (suction) for inspiration usually used. May use positive pressure (expiration) in attempt to overcome venous pooling	Respiratory failure when prolonged aid is needed	Since negative pressure applied to entire body may diminish cardiac filling due to pooling of blood in extremities and trunk may be dangerous in forward failure
Cuirass respirator		As for body respirator especially in convalescent or stabilized poliomyelitis	More physiological than body respirator. Less interference with circulation. Often uncomfortable or hard to fit for prolonged time. Unsatisfactory in severely poliomyelitis
Rocking bed	Respiration controlled mainly by abdominal contents dropping away from or pushing diaphragm	Less degree of respiratory failure as above	Momentarily excellent for improving circulation to dynamic and renal drainage in patient with combined respiratory and body paralysis

ARTIFICIAL RESPIRATION

Artificial respiration must be administered promptly to person whose respirations have ceased whether due to drowning or suffocation, electric shock, or other accidental cause. *Manual artificial respiration should never be postponed while waiting for the arrival or institution of treatment with a mechanical resuscitator.*

This procedure replaces spontaneous respiration and provides oxygen to the tissues until the paralyzed respiratory center recovers and resumes its normal function. As long as the heart continues to beat, the patient has a chance of recovery, and this may occur even after many hours of artificial respiration.

The push-pull methods of artificial respiration are more than twice as effective as the simple push methods (e.g., Schafer)

The generally approved method at present is the arm lift-back pressure (Nielsen) the hip lift-back pressure and the arm lift-chest pressure (Sylvester) methods are less efficient than the Nielsen method but are preferable to the simple push methods.

General Procedure

- A Clear the airway and begin artificial respiration at once and lay of only a minute or two reduces the victim's opportunity for recovery.
- B Do not stop artificial respiration until normal respiration is established or until rigor mortis begins.

Technic of the Arm Lift-Back Pressure Method (Nielsen)

- A Position of Patient The patient is placed prone with his head turned to one side and resting on the backs of his hands.
- B Position of Operator The operator kneels (on either or both knees) at the patient's head and then grasps the patient's arms at a point between the elbows and the shoulders.
- C The Rate of Resuscitation The rate of resuscitation is maintained by 10 to 12 complete cycles a minute. This rate can be timed by a watch or by counting the following numbers 1001 1002 1003 1004 1005 1006 and the repeating. This manner of counting requires about 1 second for each number. These seconds should be allowed for each arm lift and for the



1 Place hand in arm lift



2 Rock backward and lift arms



3 Place hand for back pressure



4 Rock forward and press back

The Arm Lift-Back Pressure Method of Artificial Respiration

back pressure. When possible, operation should be alternated at 20 to 60 minute intervals.

B Procedure of Resuscitation

- 1 **Arm lift** The operator lifts the patient's arms upward and toward himself as he rocks backward on his knees. The arms of the operator are kept straight during the entire procedure. This arm lift enlarges the thoracic cage and causes inspiration. The arm lift is continued until resistance is met; the patient's arms are then returned to the ground and the operator places the palms of his hands on the patient's back.
- 2 **Back pressure** With the palms of the hands on the lower part of the shoulder blades and the fingers extended over the thoracic cage, the operator rocks forward on his knees and with his arms straight exerts hard pressure directly downward on the thorax until resistance is met. The cycle is then repeated.

Mechanical Resuscitators

In competent hands mechanical resuscitators are more effective than and should replace manual artificial respiration as soon as available at the site of emergency. However, it should be emphasized that a mechanical resuscitator should only be used by trained personnel and when it is in proper mechanical condition.

AEROSOL THERAPY

There are two types of aerosol therapy: intermittent and continuous. Intermittent therapy is the more commonly used. Recent work suggests that continuous administration of water or saline by mist or fine particle size allows for better humidification with less irritation from oxygen and appears to be more physiologically effective in inhalations. Continuous aerosol should preferably be employed in all conditions where there is a true or potential tracheobronchial irritation. Surface tension lowering agents, antibiotics, and bronchodilators may be used by this method.

The administration of antibiotic agents by aerosol inhalation has been of value in some lung infections. Certain pieces of equipment are necessary in order to administer aerosol therapy.

- A **Nebulizers** producing particles smaller than 5 to 10 μ in diameter. The most satisfactory nebulizers are the Vaponephrine® model and the DeVilbiss No. 40®. For continuous administration of aerosols, apparatuses with large capacities are available (e.g., Mist-O-Gen®, Humidox®).

B Sources of Pressure for Nebulizing Drug

- 1 Oxygen from a cylinder at 6 to 10 liters per minute is usually used.
- 2 Compressed air from a diaphragm type compressor [Caution: Do not use an oil sealed pump.]
- 3 Manual pumping devices (e.g., foot bellows or pumps) have been employed but are generally not very useful as they tend to tire the patient and are inefficient.
- 4 Nebulizer with hand bulb may be employed but is quite inefficient because it does not produce an aerosol of sufficient length of time.

C Drug and C ent tions Employ d (Should b prepa d f sh daily) Th f que y and d at n f r atme t dep nds upon the d eas and t s v rity

1 Antib otics

- a Pen illin Usual dose is 50 000 100 000 units pe treatme t Dilute in 1 0 2 0 cc of w t r
- b St eptomycin 0 25 0 5 Gm in 1 0 2 0 cc of wat r Oxytetra yclin (T r amy m[®]) a rosol ■ 100 mg in 1 0 2 0 c 75% propylene glycol

2 En ym

Although tryp in (Trypt r[®]) has b advocat d to d lve thi k ten ous m us or dead t su in chronic b onchitis or b onch ctis untowa dr ctions and b arre changes in cell h v been ob erv d with ts u It must be us d with gr at uti n follow ng instructio s car f lly Do ge 1 3 c f trypsin ol t n (40 000 units/) prep ed by dissolving th d ypowd in a sp Al buff r (pH 7 1) Administ 4 times d lly f up to 4 ■ days f r ach o e D ot employ w thin one week after f ank h m rh g My be combin d with p icillin t ptomy in and bron h l dil tors

- b Oth ym h v b e u d { g des xy bo ucle s (Dorna e[®]) ■ i mu t at il b on der d expe im ntal

3 Br nchodil t rs

- a I p of r ol (Isup l[®] Al drin[®]) 0 1 0 5 f 1 100 or 1 200 ol t n
- b Epin phrine (adr nai) 0 5 c f 1 100 tut on

4 S f c t us on lowe ing ag nis V ous rf e ten ion l w r g ag nis hav be advi d to s d in sp e ding and f mation of ools Th r valu s till uncertain Am ng the dr gs e Al vair[®] ethyl al h l tc

II M th ds f Adm ni t ation

- 1 Oral nhal t nd ng aspi t ryph F th gre t st ff t ■ ffic n y th a r ol ho ld be inhal d th ough the mouth

Co ti vou p s f m xyg ntank A Y tub s rt d b tw en b h r and ur of p ss re Nebul s t o w il cu o ly wh n th attach d e d of th Y tub s l ed by the thumb a f g the e lly a f w cond d lay befor th e ol ar v at the mouth p

- b Int mitt t p ss e (g foot b llow p mp) is pplid du ing inspi at n

- 2 If th p t nt is u abl to op te th b h r may be s d w th an xyg n m sk wh h b s a ■ thung bag at t h d Th n b l pla d b twe n ma k and oxyg n

Chapter 7

DISEASES OF THE HEART*

CONGENITAL HEART DISEASE

Congenital disorders of the heart which are amenable to surgical correction are presented below

Although in many instances the diagnosis of congenital heart disease can be made on clinical grounds alone, most cases require special studies which are best performed in medical centers. Such procedures as cardiac catheterization, venous and retrograde aortography, and tomography are not suitable for the occasional investigation; they are difficult to perform and interpret and require skilled teamwork.

Curative intracardiac surgery with a pump-oxygenator is now feasible with an acceptable mortality risk in a few medical centers. It is the procedure of choice for tetralogy of Fallot, ventricular septal defect, mitral stenosis with normal aortic root, atrial septal defect with an ostium primum defect, and congenital aortic stenosis. Not all patients with these conditions require reparative surgery, however.

Tetralogy of Fallot (code No. 413.0x0)

All children with the tetralogy of Fallot should be operated upon because so few reach the age of 21 if untreated. Syncope is an urgent indication for operation. Because of the higher operative mortality rate in the adult age group, patients over the age of 21 are operated upon only if they are seriously disabled.

Mitral Stenosis With Normal Aortic Root (code No. 413.0x0)

This condition is frequently overlooked in the early recognition, being one of the most common congenital lesions. Depending upon the severity of the lesion, the patient may be asymptomatic or may show all degrees of cardiac disability up to severe cardiac failure with low cardiac output.

If severe stenosis is manifest (right atrial systolic pressure of at least 100 mm Hg and progressive right ventricular enlargement), surgical treatment is indicated.

If the stenosis is mild, the patient may be asymptomatic for years.

For drugs used in treatment of cardiovascular diseases
pages 195 to 206

Used Atlas (code No. 452 017)

The condition is recognized by the combination of a centrally located congenital rib lesion, a dominant alpha wave in the venous pulse and evidence of left ventricular hypertrophy clinically and electrodiagnostically. A Blalock anastomotic operation is the treatment of choice.

Pet t Du t s A t ion (de No 40 0 0)

This relatively common local area security from complete absence of symptoms to frank cardiac failure

The indication for ligament of a patellar tectum in the presence of palmar artery hypertrophy has not been established. Current opinion favors ligation whenever flow through the duct is predominantly or intermittently from left to right.

Be use of th low op at ve mortality rate (less than 1%) in
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Código do Artigo (de N. 461.018)

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Retention of the evidence is a matter of medical opinion and procedure. The neglect of the patient is a matter of course and the surgical mortality is in the neighborhood of 3% even in the best hands. For this is not all physicians recommend to the patient in symptomatic individuals. The risks of the disease are such however that if a child dies logical suggestion is a reliable indicator up to the age of 20 years should be considered. Between the age of 20 and 35 surgery is advisable if we can make it clear that the patient is doing badly.

Attri 1 S pt 1 Defe 1 (code N 41 Out)

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A omalous ■ lm ■ ry V no D ■ gt (ode No 488 02)

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Ventricular Septal Defect (cod No 413 0xx)

Ventricular septal defect vary in severity from trivial asymptomatic lesions with normal cardiac hemodynamics to extensive lesions causing death from cardiac failure in infancy. The former do not require surgery. The ideal case for curative repair with cardiac bypass technique is one with a large left to right shunt, left ventricular hypertrophy, and only moderate pulmonary hypertension. When severe pulmonary hypertension is present (pulmonary arterial pressures of more than 65 mm Hg) and the left to right shunt is small, the surgical mortality risk is about 50%. If the shunt is reversed surgery is contraindicated.

HYPERTENSIVE CARDIOVASCULAR DISEASE

(code No 400 533)

Hypertension per se is a manifestation, a hemodynamic sign and the course of the disease is adversely affected by

1. Cardiac failure secondary to increased work of the heart and relative or absolute coronary insufficiency
2. The development of atheromata especially in the cerebral and coronary arteries with syndromes resulting from vascular occlusion
3. Acute vascular cerebrovascular autting from rapid sustained rises of diastolic blood pressure usually exceeding 130 mm Hg which produce the complication known as the malignant phase. Renal failure occurs almost exclusively in this last group.

Evaluation of the Hypertensive Patient

Hypertension is a nonspecific sign and may be present in a variety of diseases some of which are curable or can be modified by treatment. The first step in the treatment of patient with elevated diastolic blood pressure is to recognize certain reversible conditions in which hypertension occurs. These diseases include unilateral or bilateral glaucoma, follow-up partial or total obstruction of the ureters with pyelonephritis, obstructive uropathy, pheochromocytoma. Lushington's disease, vascular angioma, coarctation of the aorta and acute glomerulonephritis.

The severity of the vascular hypertension and the integrity of the vital organs commonly affected by hypertension (heart, brain, fundi, kidney) must be assessed before the appropriate plan is planned.

Classification of Severity of Hypertension and Its Complications

Hypertension may be classified as follows

- A. Severe Papilledema or retinal exudates in the fundi, cardiac failure or disabling dyspnea, disturbance of consciousness, repeated cerebral thrombosis with neurological sequelae, rapidly advancing diastolic hypertension with progressive left ventricular hypertrophy.
- B. Moderate Signs of left ventricular hypertrophy, aortic atherosclerotic changes in the fundi, old cerebral thrombosis with sequelae, early controlled coronary insufficiency.
- C. Mild Diastolic blood pressure below 125 mm Hg with minimal or no objective signs of vascular damage in fundi, heart, brain or kidney.

Methods Available for Lowering Blood Pressure

- A. Drugs (See below) R. which compounds v. strum com pound hydrazine hydrochloride (Apresoline[®]) in the compound and m. camylamine (Isoniazide[®]) and thiocyanate is a diuretic. Chlorothalidate (Durlin[®]) is a new diuretic which is about 50% of the dose required of furosemide. Chlorothalidate is available in capsules. Dose: 0.5 to 0.75 Gm (7 1/2 to 12 gr) daily in divided doses. Use with due caution for electrolyte depletion.
- B. Sympathetic my.
- C. Low salt diet.
- D. Other (e.g. psychotherapy, etc.)

Indications for Potent Hypertensive Drugs and/or Sympathetic my.A. Diuretics

1. Malignant hypertension.
2. Hypertensive cardiac failure when a diuretic is indicated (e.g. pulmonary edema).
3. Rapidly advancing diastolic blood pressure with left ventricular hypertrophy and dilation. Evidence of deterioration in the heart and fundus (urate diuresis, hemorrhage) especially in young patients.

B. Potent Drugs (e.g. Explo, Isoniazide, Strogan)

1. Recurrent mild or moderate hypertension with a slight increase in diastolic pressure and high diastolic pressure.
2. A symptom of men with diastolic blood pressure between 125 and 130 mm Hg but without other evidence of complication of hypertension.
3. Severe intractable hypertension. Indicated in the absence of obvious emotional factors.

C. Nifedipine with Potassium

1. Mild to moderate hypertension in middle-aged women with no other evidence of vascular deterioration or complication.
2. Early or mild hypertension in young individuals without obvious evidence of vascular deterioration or complication.

Hypertension and Drugs

Mild hypertension is seen in apically middle-aged women live many years in comfort. The effect of great care should be exercised in the treatment of significant decreases in the space of life obtained for the subject of these patients to the disadvantage of efforts to prevent the danger of continuing a program of drug therapy. Hypertension arises at a slightly earlier rate than the treatment should be a decided dependence on the safety of the hypertension and the presence of complication.

See also the new available but not at all for the effect of the diuretic furosemide. It is with moderate or even from the diuretic mild benefit of a trial of the therapy. Use the latter drug for mild hypertension. Over a period of months, a slight to moderate lowering of the blood pressure may prove to decrease or possibly even the vascular complications of hypertension. Combination of drug may prove to be a suitable alternative to a single drug. However, it is not to be forgotten that the combination of its use is a delicate

158 Hypertensive Cardiovascular Disease

In most severe cases ganglionic blocking agents should be considered but in some instances of less severe disease it will be worthwhile to begin with rauwolfia and then either add another drug or change to a more potent drug if rauwolfia is not effective.

- A Rauwolfia Drugs** Rauwolfia has a relatively slight hypotensive action but may be useful because of its mild sedative effect and its value as an adjunct when combined with methonium compounds, veratrum or hydralazine (Apresoline®). Although it is the least toxic of the hypotensive drugs, nasal stuffiness may be annoying. Gastric hyperacidity may occur with larger doses. Sodium retention or severe depression may occur in which case the drug should be withdrawn. Dosage:
- 1 Reserpine N N D (Reserpid® Serpasid®) 0.1 to 0.25 mg (1/800 to 1/250 gr) tid orally at onset. Maintenance therapy 0.25 to 0.5 mg/day.
 - 2 Rauwolfia N N D (Raudixin®) (Rauwolfia serpentina whole root) 100 to 200 mg (1 1/2 to 3 gr) daily.
- B Veratrum Compounds** These compounds have not received universal favor because of the narrow margin between their therapeutic and toxic effects, nausea, vomiting, and weakness. More recently purified preparations, particularly Protoveratrine A and B N N D, have been found useful especially in hypertensive emergencies. In these situations (heart failure complicating acute nephritis, the convulsions of eclampsia, hypertensive pulmonary edema) give protoveratrine as follows:
- 1 Acute hypertension
 - a 1 V 1.5 to 3 mg/Kg. The hypotensive effect lasts 1 to 3 hours.
 - b 1 M 1.2 mcg/Kg every 8 hours.
 - 2 Chronic hypertension 0.4 to 1.5 mg (1/150 to 1/40 gr) orally tid or qid after meals (average dose). The dose must be carefully regulated; a difference as slight as 0.5 mg may make the difference between effective vomiting and the absence of toxic symptoms.
- C Hydralazine Hydrochloride N N D (Aprisolin®)** The usual dosage of this drug is 25 mg (3/8 gr) orally tid progressively increasing to a total dosage of 300 mg (5 gr) a day. The results of the oral use of this drug as a sole method of therapy are often not impressive but some patients obtain a hypotensive effect. Because Aprisolin® is the only hypotensive agent which increases the renal blood flow, it may be useful as an adjunct to oral methonium compounds (ganglionic blocking agents).
- Toxic side effects are common. The most important are headache and palpitations with tachycardia. A syndrome resembling diffuse collagen disease has occurred usually after large doses have been used for many months.
- D Ganglionic Blocking Agent** The most frequently used of the agents are P-nitrophenyltolazate N N D (Apaplysen®), Chlorisondamine Chloride N N D (Ecolid®) and Mecamylamine Hydrochloride N N D (Iverside®). They can be used orally, subcutaneously, or intravenously. At the present time, with the exception of Iverside®, the oral route has the disadvantage of small and irregular absorption from the gastrointestinal tract with resultant unpredictable falls in blood pressure.

Basic principles

- a Hospitalize patient under close supervision
- b Start with small initial dose and increase gradually depending upon the tolerance and response of the patient. The degree of reduction of pressures should be only moderate in the first week or so and no attempt should be made to reduce the pressures to normal until it has been demonstrated that the patient can tolerate systolic pressures of below 160 mm. Hg without hypotensive symptoms
- d Postural hypotension which is great at the height of the effect of the drug should be considered not only as a potential danger to the patient but also as a therapeutic weapon to prolong the hypotensive action of the drug after the peak effect has worn off

- 2 Oral ganglionic blocking agent. A trial of 2 or 3 weeks usually required before the dose required to lower the blood pressure to a level approximating 160/100 mm Hg can be determined. The patient may then be seen as an out patient and the dose gradually increased to that level which produces the desired fall of pressure. Whether the desired level of pressure at the time of peak action of the drug is in the range of 150 to 160 mm Hg systolic or with the risk that which results in mild hypotensive symptoms on standing has not been determined. Constipation is to be avoided in patients receiving guanethidine compounds because it increases the absorption of the drug. Laxatives should be given to ensure a daily bowel movement.

Although the determination of the proper drug dosage is difficult, it is usually considered satisfactory if the diastolic pressure is of 100 mm Hg or less and a has been. Since the effectiveness of the drug cannot be determined by usual blood pressure readings in the physician's office, the following methods have been used to determine effective dosage.

- (1) Home blood pressure readings by either the patient or a responsible member of the family are recorded and when to the physician at his regular visits. On the basis of these readings the physician may increase or decrease the dose. The patient is instructed to decrease the dose whenever the blood pressure falls below 150/90 and not to take a dose if the blood pressure is below 130/80 in the recumbent position.
- (2) Motionless standing for one minute prior to a dose is added to prevent excessive hypotension. If an individual can stand motionless for one minute prior to a dose, his blood pressure will be sufficiently high so that an additional dose of the drug can be taken. The only guard against excessive dosages and doses of individual when the dose has been increased is (3) Periodic hospitalization for a day or two to determine basal blood pressure readings. These readings are often 50 to 100 mm Hg less than casual readings obtained in the doctor's office and can be used to control the dosage of the sympathomimetic compounds.

The initial dosage of the ganglionic blocking compounds orally is as follows:

- a Hexamethonium 125 mg (2 gr)
- b Prolisina Tartrate N N D (Ansoylasol) 10 to 20 mg (46 1/3 gr)

In most severe cases ganglionic blocking agents should be considered but in some instances of less severe disease it will be worthwhile to begin with rauwolfia and then either add another drug or change to a more potent drug if rauwolfia is not effective.

A Rauwolfia Drugs Rauwolfia has a relatively slight hypotensive action but may be useful because of its mild sedative effect and its value as an adjunct when combined with methonium compounds veratrum or hydralazine (Apresoline®). Although it is the least toxic of the hypotensive drugs nasal stuffiness may be annoying. Gastric hyperacidity may occur with larger doses. Sodium retention or severe depression may occur in which case the drug should be withdrawn. Dosage:

1 Reserpine N N D (Reserpoid® Serpasul®) 0.1 to 0.25 mg (1/500 to 1/250 gr) t.i.d. or b.i.d. at onset. Maintenance therapy 0.25 to 0.50 mg/day.

2 Rauwolfia N N D (Raudixin®) (Rauwolfia serpentina whole root) 100 to 200 mg (1 1/2 to 3 gr) daily.

B Veratrum Compounds These compounds have not received universal favor because of the narrow margin between their therapeutic and toxic effects: nausea, vomiting, and weakness. More recently purified preparations, particularly Protoveratrine A and B N N D, have been found useful especially in hypertensive emergencies. In these situations (heart failure complicating acute nephritis, the convulsions of eclampsia, hypertensive pulmonary edema) give protoveratrine as follows:

1 Acute hypertension

a I.V. 1.5 to 1.9 mcg/Kg. The hypotensive effect lasts 1 to 3 hours.

b I.M. 1.2 mcg/Kg every 8 hours.

2 Chronic hypertension 0.4 to 5 mg (1/150 to 1/40 gr) or b.i.d. or q.i.d. after meals (average dose). The dose must be carefully regulated at times a difference as slight as 0.5 mg may make the difference between sudden vomiting or the absence of toxic symptoms.

C Hydralazine Hydrochloride N N D (Apresoline®) The initial dose of this drug is 25 mg (3/8 gr) orally t.i.d. progressively increasing to a total dosage of 300 mg (5 gr) a day. The results of the oral use of this drug as a sole method of therapy are often not impressive but some patients obtain a hypotensive effect. Because Apresoline® is the only hypotensive agent which increases the renal blood flow it may be useful as an adjunct to oral methonium compounds (ganglionic blocking agents).

Toxic side effects are common. The most important are headache and palpitations with tachycardia. A syndrome resembling diffuse collagen disease has occurred usually after large doses have been used for many months.

D Ganglionic Blocking Agents The most frequently used of these agents are Pentolinum Tartrate N N D (Apodynase®), Chlorisondamine Chloride N N D (Ecolid®) and Mecamylamine Hydrochloride N N D (Inverase®). They can be used orally, subcutaneously or intravenously. At the present time with the exception of Inverase® the oral route has the disadvantage of small and irregular absorption from the gastrointestinal tract with resultant unpredictable falls in blood pressure.

- a Acute hypotensive reactions are manifested by faintness, weakness, and nausea and vomiting. The patient should be instructed to lie down immediately when these occur and place his feet higher than his head. Unless the hypotensive effect is too severe, the symptoms pass off rapidly with this positional assistance. If the symptoms persist, give a vasopressor drug such as Phenylephrine Hydrochloride U.S.P. (Neo-Synephrine®) or Methoxamine Hydrochloride U.S.P. (Vasoxyl®) subcutaneously. A low concentration of intravenous infusion of Levaterol Bitartrate U.S.P. (Levophed®) 4 mg/lite (see page 419).
- b Aute or progressive renal failure tends to decrease renal blood flow or filtration pressure may require discontinuance of the drug.
- c Vascular thromboses are a hazard in older patients who suffer severe hypotensive falls.
- d A low sodium diet potentiates the action of methonium compound, and if an individual is receiving fixed doses of the drug, a low sodium diet hypotensives symptoms more. It is usually desirable to place the patient on a 5 Gm (22 g) sodium diet at the onset of therapy.
- e Alcohol heightens vasodilator drug vigils and is and salt depletion potentiates the action of methonium compound.
- f Parasympathetic effects (due to parasympathetic blocking). Blurring of vision, constipation, and dryness of the mouth can be counteracted in part by the use of neostigmine usually in doses of 7.5 to 15 mg (1/8 to 1/4 g).

Surgical Procedures

- A Sympathectomy. The thoracic division of sympathectomy has been highly controversial although many authorities agree that it prolongs life when a risk is on patients with early malignant hypertension when a radical cure is good.
- B Adrenalectomy. The effects of this procedure have not been completely worked out although many patients with severe hypertension have received considerable benefit.

Low sodium diet

A rigid low sodium diet contains 350 mg (5 3/4 gr) of sodium chloride per day. It is very strict but the diet is good for the patient and it is difficult to eat it for the first and second weeks. It would not be indicated only in the treatment of hypertension so that when drug therapy is indicated. The diet should also be used as an adjunct to the treatment of hypertension. Food intake of the low sodium diet is 55.

Psychotherapy

Clinical evidence is available to indicate that the hypertension is related to emotional conflict particularly of the so-called psychosomatic type and depression and individual emotional disturbance. It is important to understand the relationship between the emotional and the physical aspects of the disease.

- c Chlorisondamine Chloride N N D (Ecolid[®]) 10 20 mg
($\frac{1}{6}$ $\frac{1}{3}$ gr)
- d Mecamylamine Hydrochlorid N N B (Ioversine[®])
1 2 B mg ($\frac{1}{60}$ $\frac{1}{24}$ gr)

3 Parenteral ganglionic blocking agents

- a Hexamethonium ion The initial dose is usually 2 5 5 mg
($\frac{1}{24}$ $\frac{1}{12}$ gr) of the ion given subcutaneously If no untoward effect occurs the dose can be repeated in 12 hours On the second day 5 mg ($\frac{1}{12}$ gr) may be given twice at 12 hour intervals and the dose gradually increased On discharge from the hospital in 2 to 3 weeks the average patient receives about 75 mg ($1\frac{1}{4}$ gr) twice daily In some patients it may be necessary to give the drug 3 times a day but the increase in dosage should always be made gradually (2 5 5 mg or $\frac{1}{24}$ $\frac{1}{12}$ gr /dose) and the patient observed for several days after each increment before going on to the next level Caution should be exercised in older patients to avoid lowering the pressure too rapidly this is true also of those patients with evidence of atheroma in the cerebral or coronary arteries as acute hypotension may result in thrombosis of these vessels
- b Pentolinum Tartrate N N D (Anslysen[®]) The initial dose is 1 2 mg ($\frac{1}{60}$ $\frac{1}{30}$ gr) of the salt given subcutaneously If no untoward effect occurs the dose can be gradually increased beginning on the second day by increments of 0 5 mg ($\frac{1}{120}$ gr) On discharge from the hospital the average patient receives 5 to 10 mg ($\frac{1}{12}$ $\frac{1}{6}$ gr) per day in divided doses The same precautions noted for hexamethonium are to be observed

Following discharge the patient should be seen at frequent intervals and the dose adjusted so as to achieve the desired effect without undue faintness or side effects In some patients in order to prevent a postural hypotension which may produce severe symptoms during this period it may be necessary to have the patient lie down for one hour after each injection In many of these patients however tolerance gradually develops although marked hypotension may still occur on standing the patient may be able to sit or walk immediately after an injection Patients should be warned to avoid motionless standing for an hour or more after an injection avoiding waiting in line for a bus and similar activities should be particularly condemned

- 4 Acute hypertensive emergencies Give hexamethonium intravenously at a rate of approximately 1 mg ($\frac{1}{60}$ gr) per minute to a total dose of not more than 20 mg ($\frac{1}{3}$ gr) depending upon the response of the patient to escape 2 5 mg every 1 hour The most important of the emergency situations treated in this way is a pulmonary edema associated with a marked rise in blood pressure occurring in hypertensive patients with left ventricular failure Pulmonary edema may improve dramatically under these circumstances but great caution must be used to give the drug slowly and to discontinue administration when a moderate fall in pressure has been achieved A further fall in blood pressure may occur for a time after the drug is withdrawn

- 5 Side effects and hazards of ganglionic blocking agents

ANGINAL SYNDROME

(A gina Pecto is) (code No 401)

The diagnosis of angina pectoris must be based upon positive diagnostic criteria not satisfied by exclusion. The diagnosis depends upon proper interpretation of a careful history and a accurate evaluation of the credibility of the patient.

Diagnosis

The cardinal symptom of the anginal syndrome is pain induced by anything that increases the work of the heart (e.g., exertion, excitement, cold, heavy meals). Pain is usually substernal. It may be precordial. The onset is sudden but not instantaneous as its character is that of pressure or a squeezing sensation of significant but short duration. It usually lasts more than 15 or 20 minutes.

Treatment of the Acute Attack

A. Specific Measures (Nitrites)

1. Glyceryl Trinitrate U.S.P. B.P. (nitroglycerin) is the drug of choice. It acts in about 1-2 minutes. As soon as the attack begins place 0.3 mg ($\frac{1}{200}$ g) tablet under the tongue and allow it to dissolve. The dose may be increased to 0.6-0.8 mg ($\frac{1}{100}$ - $\frac{1}{80}$ gr) if no relief is obtained from a small dose. Nitroglycerine may be administered whenever an attack occurs or may be administered to prevent an attack. It may cause headache and hypotension.
2. Amyl Nitrite U.S.P. B.P. 1 cc shaken and inhaled acts in about 30 seconds. This drug usually causes disagreeable reactions of flushing of the face, pounding of the pulse and sometimes dizziness and headache. The reaction may be minimized by inhaling the drug from a distance or by partially pinching the crushed pearl before the nose. The patient should learn how to vary the amount of drug which is inhaled.
3. Longer acting nitrites and other drugs have no place in the therapy of the acute attack.
4. Alcohol 30-60 cc (1-2 oz) of whiskey, brandy, etc. may be a helpful home remedy.

B. General Measures. Rest is the most important therapy in an attack. The patient should cease any exertion and should stand still. If he lies down on a bed to rest on the onset of pain and until the attack is over. This generally is the natural reaction of most patients. It is sometimes necessary to work the attack off. Patients should beware of gauging the

Prevention of Further Attacks

A. Specific Measures

1. Drugs

Longer acting nitrite P. t. e. ythritol Tetranitrate N.N.D. (P. rit. te[®]) must be the most effective of these. The suggested dose is 10 mg ($\frac{1}{8}$ g) tid. c.
 1. Glyceryl Trinitrate U.S.P. B.P. (Nitroglycerine) 0.3-0.6 mg ($\frac{1}{200}$ - $\frac{1}{80}$ gr) under the tongue just before activity.
 2. Xanthin. This drug may be of some benefit only in 1. grade 1 (see page 204).

aggravate the degree of existing hypertension and increase the load on the heart and kidney. Attempts have been made to treat hypertensive patients with psychoanalytic methods. But the effect on the blood pressure has been poor even though symptoms may often be improved. Reversal of hypertension following psychotherapy has been extremely rare. Attention to the emotional needs of the patient is an important adjunct to other methods of treatment but should not be the sole method of treatment except in the mild benign forms of the disease in which drug or surgical therapy is not indicated.

Other Method of Treatment

A. Sedation. Nervous tension is frequently found in the hypertensive patient and may aggravate his illness. In many cases sedation either used alone or as an adjunct to other forms of medical therapy will be of decided benefit. Phenobarbital is the drug most commonly used. Dosage 15-30 mg ($\frac{1}{4}$ to $\frac{1}{2}$ gr) t.i.d. to q.i.d.

B. Drugs which have evoked little general enthusiasm despite occasional favorable results because of the unpredictable effects on the hypertension and the high incidence of unpleasant side effects include Dibenamine[®], the dihydrogenated ergot preparations Toluoline Hydrochloride U.S.P. (Priscoline[®]) and potassium thiocyanate and the long acting nitrites.

Treatment of Complications

The cardiac, cerebral and renal complications of hypertension are discussed under congestive failure (see page 181), angina pectoris and myocardial infarction (see page 163), cerebral hemorrhage and thromboses (see page 349) and renal failure (see page 301).

Headache

The headache of hypertension is largely on an emotional basis. Suggestion and explanation are often helpful. Hypotensive drugs are most effective in relieving even the headache associated with the malignant or pre-malignant phase of hypertension.

CORONARY HEART DISEASE

Coronary Insufficiency

Coronary insufficiency is a dynamic concept which is concerned with the balance between the blood flow in the coronary arteries and the demands of the myocardium for blood. It exists whenever the requirement of the myocardium for oxygenated blood exceeds the flow of blood of the myocardium at any instant.

Coronary insufficiency may be acute and transient in which case it is called an angina pectoris. It may be a late protracted and associated with myocardial infarction or it may be subacute moderately protracted and without myocardial necrosis but clinically recognizable. The latter form has been called coronary failure by Blumgart and his associates and is thought to represent occlusion of a relatively minor coronary artery with sufficient collateral circulation to prevent myocardial necrosis. Treatment is similar to that of a mild infarction.

- 2 Abdominal support Obese patients with protuberant abdomens who have angina may have fewer attacks following the use of proper abdominal support. The mechanism is not clear. The Kerr-Lagen b is designed for this purpose.
- 3 Surgical procedures These have been employed only in patients with severe inoperable angina pectoris in whom medical treatment has failed. The results to date have been inconclusive. Studies now under way on the ligation of the internal mammary arteries have yet to be evaluated.
- 4 Production of myxedema by means of thiouracil compounds or radio active iodine (I^{131}) (see p. 372). The objective is to reduce the work of the heart. Good results have been reported in about half of the cases of intractable angina, but this method should not be used until prolonged rest and attention to the emotional needs of the patient have ruled out a transient reversible coronary insufficiency.

General Measures

- 1 The patient must avoid all habits and activities that he knows will bring on an attack.
- 2 Treatment of existing disorders especially anemia which may lead to increased cardiac ischemia.
- 3 Rest. Most patients with angina do not require prolonged bed rest, but rest and relaxation are beneficial. Adequate mental rest is also important.
- 4 Diet. Obese patients should be placed on a reducing low animal fat diet and their weight brought to normal or slightly subnormal levels.
- 5 Tobacco is best avoided or used in moderation because it produces tachycardia and elevation in blood pressure.
- 6 Hypercholesterolemia has been shown to accelerate atherosclerosis in man and to be essential in its production in animals. If the serum cholesterol exceeds 260 mg % in a patient with angina pectoris an attempt should be made to lower it by diet with total calories containing about 25% fat (50% vegetable and 40% animal). If this is unsuccessful beta-sitosterol (Cytel 10) may be added 1 or 2 Tbsp immediately before each meal. It has not been shown, however, that lowering the serum cholesterol level will reverse the atherosclerotic process.

ACUTE MYOCARDIAL INFARCTION (code No. 430.516.7)

Myocardial infarction is due to necrosis of a portion of the cardiac muscle as a result of impairment of its blood supply. This impairment usually results from occlusion of a thrombus of a coronary artery, but it may result from impaired blood flow as a result of shock or acute anemia from any cause. Myocardial infarction varies quantitatively from histologically insignificant to massive necrosis. The infarction may be essentially asymptomatic.

The onset of an angina pectoris may be associated with coronary occlusion even though infarction does not occur (if the collateral blood flow is adequate). The prognosis is better than previously thought.

fall early and digitalize with care (see page 197)

- 3 Stokes-Adams attacks with heart block is an emergency (see page 180)
- 4 Thrombo-embolism phenomena are common during the course of myocardial infarction. If anticoagulant have not been given they should be promptly administered (see page 215)
- 5 Extension of the infarction. When rest is impossible during the first few days after the infarction in hospitalized patients should be suspected and confirmed. It is important in the electrocardiogram and in other clinical features. The same method of treatment applies to the original infarction but the prognosis is equal.

Activity Status in Coronary Disease

The minimum period of rest should be at least 3 weeks after the attack has been over. The patient should be encouraged to appear as much as possible. The program for most patients is 1 month of complete rest 1 month of low activity and a third month of rest followed by a period of gradually increasing activity. The amount of rest should be individualized according to the severity of the myocardial infarction and the response of the patient.

The patient should be permitted to walk freely about the room for about 7-10 days after the attack. All weight lifting and all strenuous physical activity is most important. He should remain on the armchair with gradually increasing periods of walking slowly and with frequent resting periods. Dyspnea and tachycardia should be noted. When the patient is allowed to do daily activities 2 months after the infarction he should avoid hills and stairs if another month

CHRONIC RHEUMATIC HEART DISEASE

Rheumatic heart disease is one phase of the rheumatic fever cycle. The stage of symptomatic valvular heart disease with the diagnosis is the late period between the subacute and acute rheumatic fever and the terminal phase of cardiac failure. The physician endeavors to prolong the late phase as much as possible.

Management of Asymptomatic Valvular Heart Disease

A Prophylaxis

- 1 Prevention of uremia of a patient with heart failure
 - a Administer penicillin to prevent subacute bacterial endocarditis
 - b Continue antibiotic prophylaxis in selected cases
 - c Prompt and adequate treatment of hemolytic anemia
- 2 Prophylactic digitalization to avoid digitalis toxicity
 - a Educate the patient and the family about the proper use of digitalis
 - b Monitor the patient's response to digitalis

B General Measures

- 1 Prevention of alcoholism to avoid a fatal period when the patient is unable to take any food or fluids
- 2 Early recognition of digitalis toxicity and its treatment by digitalis therapy
- 3 Initiation of general health with good habits and diet
- 4 Avoidance of heavy physical exertion

is delayed and appears after the pain has subsided

- a. Vasopressor drugs Present evidence suggests that vasopressor drugs (sympathetic amines) may elevate the blood pressure and decrease mortality in myocardial infarction associated with shock. Shock must be treated early to achieve the best result. For details of the use of vasopressor drugs see page 30.

- b. Digitalis A hypotonic myocardium often accompanies acute myocardial infarction and shock may be associated with an increased venous pressure. Some investigators now favor digitalization in the shock of acute myocardial infarction. Digitalization can be accomplished in congestive heart failure. The increased cardiac output increases coronary flow and the peripheral myri-

- c. Treatment of cardiac arrhythmias Shock may be the result of undetected ventricular tachycardia or other arrhythmias and prompt treatment of the arrhythmia (see page 11) and cardiac arrhythmias may be lifesaving.

d. Whole and aprotic transfusions These have not been very effective but should be kept in mind as adjuncts.

- e. Anticoagulant therapy This is a controversial matter in the milder cases (rapid relief of pain, minimal signs of myocardial necrosis, absence of shock or cardiac failure). In severe cases of myocardial infarction, anticoagulants are generally recommended. For technique see page 215.

- f. Sedation Adequate sleep is essential in patients with myocardial infarction as well as with those suffering from cardiac failure. Sedation should be used as necessary to provide sufficient sleep and morphine derivatives should not be withheld in the first few days if they are indicated.

- g. Follow-up Cardiac clinical observation and treatment during the patient's progress. One should be alert for evidence of extension of the infarction or new infarction, the appearance of complications, or symptoms requiring treatment.

C. Treatment of Complications

1. Cardiac failure If cardiac failure develops, treatment should be initiated as early as possible. Oxygen, low sodium intake, mercurial diuretics, and digitalis are the essentials. The patient should be digitalized in such a manner as to avoid toxic reaction if possible. Rapid digitalization is avoided unless the failure is urgent. If the cardiac failure is mild and manifested solely by pulmonary edema and is caused by peripheral restriction of sodium and the administration of mercurial diuretics may be sufficient. Digitalis is avoided by some authors because of the hazard of ventricular arrhythmias but its well-controlled administration should not be deferred in cardiac failure readmission.

2. Arrhythmias

- a. Ventricular premature beats These are common and increased mortality of the degree of myocardial infarction may predispose to ventricular tachycardia. Quinidine is the drug of choice (see page 200). An alternative to quinidine is procainamide (see page 205).
- b. Ventricular tachycardia is a emergency (see page 178).
- c. Atrial fibrillation is usually transient. If this persists if the patient tolerates it poorly or if congestive heart failure

MITRAL VALVULAR DISEASE

This is the most common of valvular lesions. It takes from 3 to 5 years for mitral stenosis to develop. mitral insufficiency may occur alone or more commonly in combination with mitral stenosis.

MITRAL STENOSIS (code No 498)

In view of the excellent results obtained following mitral valvulotomy the signs of mitral stenosis should be clearly appreciated.

Diagnosis

A Signs of Uncomplicated Mitral Stenosis. The most important of these are (1) a mid diastolic long murmur always associated with presystolic accentuation if there is sinus rhythm and usually associated with a thrill (2) a snapping late systolic sound and an opening snap and (3) an apical systolic murmur at the apex or one which is short and Grade II or less.

If pulmonary hypertension is present its signs and those of associated right ventricular hypertrophy may be demonstrated.

B Exclusion of Mitral Insufficiency. Mitral incompetence must be excluded if possible. The mitral valve is operable only if the patient's condition is due to a mechanical obstruction of the mitral valve. If there is no systolic murmur in the presence of the signs of mitral stenosis mitral incompetence is exceedingly unlikely. If there is a loud pan systolic murmur at the apex in association with an accentuated often early 3rd heart sound a soft 1st sound and no opening snap the diagnosis of predominant mitral incompetence is likely even if a short mid diastolic murmur can be heard at the apex. Left ventricular hypertrophy in the ECG should make every cautious in recommending surgery for mitral stenosis because of the likelihood of significant mitral incompetence unless hypertension or an aortic valvular lesion is present. If there is a moderate systolic murmur at the apex the diagnosis must rest on a consideration of the total findings.

Surgical Treatment

The course of mitral stenosis is highly variable and in few of the mortality of mitral valvulotomy (3-5%) surgery is not advised in mild cases with slight exertional dyspnea and fatigue only. Indications for surgery include the following:

- 1 Signs of mitral stenosis with a pliable valve (opening snap snapping late systolic)
- 2 Uncontrollable pulmonary edema
- 3 Disabling dyspnea and occasional pulmonary edema
- 4 Evidence of active pulmonary hypertension with right ventricular hypertrophy and early congestive failure
- 5 Systemic and pulmonary emboli
- 6 Increased pulmonary arteriolar resistance with marked dyspnea and increased P_2 . The patients are apt to develop right heart failure and emboli
- 7 Right heart failure with atrial fibrillation tripping in incompetence when secondary to marked mitral stenosis. The

Approximate Dosage Schedules

Penicillin Intravenous (Bacterialidal at 72 Hrs) (Unit per cc)	Total Penicillin Dose per 24 Hrs (Millions of Unit)
< 0.1	1.2 (penicillinase resistant)
0.1-0.5	3.4 (aqueous)
0.5-0.9	4.5 (aqueous)
1.0-5.0	6.20 (aqueous)
> 5.0	20.500 (aqueous)

When bacteremia develops peristaltic dose should be doubled and redoubled until clinical response occurs. Alternatevely symptomatic treatment with 30 mg of biotin may be used. When high concentration of penicillin is required Penicillin NND (B. mild[®]) 0.5 Gm (7½ gr) every 6 hours may be used to inhibit bacterial growth.

- Streptomycin Sulfate U.S.P. Intramuscular or Intravenous injection is the method of choice and gives a good level of blood concentration by I.V. injection. Large doses are advised 0.5-1.0 Gm dissolved in 4 cc (1 cc) distilled water + 1-2% procaine I.M. every 6 hours should be given. Observe for toxicity.
 - Combination of penicillin and streptomycin. Preliminary evidence suggests that penicillin (5 million units/day) + streptomycin (2 Gm/day) may be the optimal treatment for infections due to Streptococcus faecalis and all of the heart (2 weeks) treatment of endocarditis due to streptococci of Streptococcus viridans.
 - Chlortetracycline Hydrochloride H.S.P. (Auromycin[®]) Oxytetracycline U.S.P. (Tetracycline[®]) Tetracycline U.S.P. (Achromycin[®]) Chloramphenicol U.S.P. (Chloromycetin[®]) and Erythromycin U.S.P. (Erythrocin[®]). While these drugs may suppress the growth of subcutaneous bacterial endocarditis their use is frequently followed by relapse. Whenever possible drugs exhibiting more pronounced bactericidal activity e.g. penicillin and streptomycin should be the first choice in treatment. The exact dosage and effectiveness of these drugs have not been established. Nausea and vomiting result frequently from the oral administration of chlortetracycline and may interfere with treatment. In such cases the drug must be given I.V. in doses of 30-100 mg or more every 6 hours.
- Although streptomycin is clinically generally inhibited by chlortetracycline oxytetracycline and tetracycline treatment with these drugs of endocarditis due to this organism is generally ineffective.
- Other drugs. Neomycin Sulfate U.S.P. (Mylid[®]) Polymyxin B Sulfate U.S.P. (Aerosol[®]) may be used alone in combination with other drugs where the organism is sensitive to these antibiotics (see page 514).

Treatment

A. Specific Measures The most important consideration in the treatment of bacterial endocarditis is a bactericidal concentration of one or more antibiotics in contact with the infecting organisms which are often localized in avascular relatively inaccessible foci. Penicillin because of its high degree of bactericidal activity against the great majority of bacteria which produce bacterial endocarditis and because of its low incidence of side reactions is by far the most useful drug. Synergistic combinations of penicillin with other antibiotics have often proved valuable. Few cases have been cured by bacteriostatic drugs such as chlortetracycline (Aureomycin®) oxytetracycline (Terramycin®) tetracycline (Achromycin®) chloramphenicol (Chloromycetin®) and erythromycin (Erythrocin®) used alone. Positive blood cultures are invaluable to confirm the diagnosis and to guide treatment and should be combined with tests of sensitivity of the infecting organism to various antibiotics or combinations of antibiotics. Hence one or more blood cultures should be obtained daily for 3 to 5 days before instituting treatment except in desperately ill patients or patients with acute bacterial endocarditis. To avoid further heart damage treatment should not be further delayed.

1. **Penicillin** This drug must be given parenterally in bacterial endocarditis to gain effective results. The dose of penicillin used depends on the sensitivity of the organism and this is determined by doing in vitro sensitivity tests. About 90% of strains of *Streptococcus viridans* from cases of subacute bacterial endocarditis have been found to be inhibited in vitro by 0.1 unit of penicillin per cc or less. However some are quite resistant requiring 5 to 10 units or more.

A minimum serum concentration many times greater than the apparent in vitro sensitivity of the organism must be produced to insure a bactericidal concentration in the circulation. Patients in whom positive blood cultures are not obtained or where sensitivity tests are not available 5 to 10 million units of penicillin should be given daily. There are three alternative methods of administration.

- a. **Procaine penicillin** For organisms sensitive to less than 0.1 U per ml of penicillin give 500,000 to 1,000,000 units of penicillin procaine I.M. twice daily.
- b. **Intermittent administration** For organisms sensitive to 0.1 U per ml of penicillin use intermittent intramuscular injections of aqueous penicillin solution every 3 to 6 hours.

or c. **Continuous parenteral administration** If the total daily dose is approximately 5 million or more units of penicillin per day administration usually best accomplished by a continuous intramuscular drip (occasionally intravenous drip). The antibiotic can be dissolved in 1000 to 2000 cc of physiological saline solution or glucose solution.

Approximate Dosage Schedules

Penicillin Dosage (Bacterial at 72 H) (Unit per cc)	Total Penicillin Dosage per 24 Hr (Millio of Units)
< 0.1	1.2 (penicillin procaine)
0.1 to 0.5	3.4 (aqueous)
0.5 to 1.0	4.5 (aqueous)
1.0 to 5.0	6.20 (aqueous)
> 5.0	20.500 (aqueous)

When bacteremia is of severe type with dosage should be doubled and continued until favorable response. Alternately synagist contraindicated with 20 percent antibiotic may be used. When high concentration of penicillin is required, Procaine PENICILLIN (B. N. D. Co.) 0.5 Gm (7½ mg) every 6 hours may be used to inhibit toxicity.

Streptomycin Sulfate U.S.P. Intramuscular Injection is the method of choice and gives a good result. The dose is 1.0 Gm daily IV. Large doses are advised 0.5 to 1.0 Gm daily in 4 cc (1 dr) distilled water + 1 cc 2% procaine IM every 6 hours. Should be given. Observe for toxicity.

3. Combined penicillin and streptomycin. Penicillin (5 million unit/day) + streptomycin (2 Gm/day) may be the optimal treatment for infective endocarditis due to streptococcus viridans and also for the short (2 weeks) treatment of endocarditis due to streptococcus viridans.
4. Chlorotetracycline Hydrochloride U.S.P. (A. roxycine[®]) Oxytetracycline U.S.P. (Terramycin[®]) Tetracycline U.S.P. (A. h. myc[®]) Chloramphenicol U.S.P. (Chloromycetin[®]) and Erythromycin H.S.P. (Erythrocin[®]) While these drugs may suppress the progress of subacute bacterial endocarditis, their use is frequently followed by relapse. When ever possible drugs exhibiting no pronounced bactericidal activity as penicillin and streptomycin, should be the first choice in treatment. The x-ray doses and effectiveness of the drugs have not been established. Nausea and vomiting frequently form the oral administration of chlorotetracycline and may interfere with treatment. In such case the drug should be given IV in doses of 50-100 mg or more every 6 hours.

Although *Streptococcus faecalis* is generally inhibited by chlorotetracycline, oxytetracycline and tetracycline, treatment with these drugs of endocarditis due to this organism is generally ineffective.

5. Other drugs. Nystatin Sulfate U.S.P. (Mylabrad[®]) Bacitracin U.S.P. and Polymyxin B Sulfate U.S.P. (A. r. sporin[®]) may be used also in combination with other drugs when the organism is sensitive to its toxic antibacterial (see page 314).

- 6 Combined therapy In infections due to highly resistant organisms synergistic pairs of antibiotics as determined by tests of bactericidal activity in the laboratory may be used (see page 486) Combined therapy should never be attempted without adequate laboratory control
- 7 Duration of treatment The suggested duration of therapy by various authorities is 2-8 weeks Most patients should be treated for 3-4 weeks after sterilization of the blood stream After therapy has been discontinued the patient should be carefully observed for recurrence by taking repeat blood cultures
- 8 Recurrences Most recurrences are observed within a week or two of the end of therapy Occasional cases relapse months later The diagnosis of recurrence must not be made on the return of fever and embolic phenomena alone these may occur for up to 6-8 weeks after therapy has ceased Positive blood cultures are essential for the diagnosis of recurrence Before re-treating one should determine the sensitivity of the organism and then give treatment with higher dosages for a longer period of time or use a different antibiotic About 70-75% recurrences are now being reported
- 9 Anticoagulants It is generally agreed that the use of heparin or 2-hydroxycoumarin U.S.P. (Dicumarol®) in the treatment of subacute bacterial endocarditis is unnecessary and may be dangerous
- B General Measures General supportive measures as for any severe infection with fever should be given
- C Complications and Treatment

- 1 Infarction Caused by emboli breaking off from the infected areas The infarctions usually occur in organs in the systemic circulation but if the endocardial lesion is on the right side of the heart the embolus may be to the pulmonary circulation Treatment is symptomatic
- 2 Cardiac failure (uncommon) A toxic myocarditis or swelling of the heart valves may precipitate congestive failure When giving large quantities of penicillin as sodium salt one may give significant amounts of sodium ion Therefore when treating a case of subacute bacterial endocarditis with congestive failure or possible failure use calcium or potassium penicillin (See congestive failure page 181)
- 3 Anemia The anemia if severe should be treated by whole blood transfusions (see page 247)
- 4 Uremia May result from focal embolic nephritis or glomerulonephritis (see page 293)

Prophylaxis

A high percentage of cases of endocarditis arise after dental procedures or surgery of the oropharynx and genitourinary tract Therefore all patients with valvular or congenital heart disease who are to have any of these procedures should be given penicillin prophylactically A satisfactory schedule is as follows Procaine Penicillin G U.S.P. 1,000,000 units daily for 2 days before procedure on the day of the procedure and for 2 days after the procedure

CARDIAC ARRHYTHMIAS*

Cardiac arrhythmia are common in every physical practitioner and a thorough knowledge of their diagnosis and management is essential. Clinical manifestations vary from trivial palpitation to a clinical state which ultimately may be fatal as when ventricular tachycardia complicates acute myocardial infarction.

Relation of Symptoms

The symptoms produced by an arrhythmia depend upon the underlying state of the heart and the nature of the arrhythmia. Even a normal heart may feel irregular if the ventricular rate is rapid enough. If the arrhythmia is a long-sustained tachycardia which may be well tolerated by the individual may produce severe pulmonary edema and other (e.g., if a patient with tight mitral stenosis). The physical examination is of value when the patient is at rest or when the patient is exerting maximal effort to treat an arrhythmia.

DISTURBANCES OF ATRIAL ORIGIN

ATRIAL PAROXYSMAL TACHYCARDIA (Code No. 422)

In the disturbance of rhythm it is thought that an episode with the attack occurs as the patient is at rest and discharges impulses at a rate varying from 120 to 320 per minute usually between 170 and 210 per minute. The rhythm is absolutely regular and is terminated by vagal stimulation or carotid sinus pressure (unless this abolishes the attack). Atrial tachycardia usually begins suddenly and it implicates even the slightest. At least half of the cases occur in individuals with organic heart disease. During an attack is rare but characteristic. The attack may occur when the patient is at rest or during the day. The attack is usually produced by emotional tension and is common in young individuals and at times are related to a circumscribed condition such as the A-V nodal form known as the Wolff-Parkinson-White syndrome. Recurrent attacks are frequent so that the problem of preventing attacks is an important consideration of the individual attack.

Treatment of the Acute Attack

The basic of heart disease is sufficient to cause a myocardial infarction subspontaneously and the physician should not underestimate their mortality. The diagnosis is usually confirmed by the fact that the attack is usually self-limiting for several days if a definite syncope or anginal pain develops. If the patient is lying down the patient should be placed in a supine position.

A number of methods have been used to interrupt attacks and the patient may be required to do the following: These include the Valsalva maneuver (holding breath and increasing intra-abdominal pressure) stretching of the arms and body lower in the bed between the knees and both holding.

II Vagal Stimulation

- 1 **Carotid sinus pressure** With the patient relaxed in the semi-recumbent position firm but gentle pressure and massage should be used first over one carotid sinus for 10 to 20 seconds and then over the other. Pressure should not be exerted on both carotid sinuses at the same time. Continuous auscultation of the heart should be carried out so that pressure is stopped as soon as the attack ceases. Carotid sinus pressure will interrupt about half of the attacks especially if the patient has been digitalized.
- 2 **Bilateral eyeball pressure** has been recommended but it is rarely as effective as carotid sinus pressure and carries the risk of producing a detached retina.
- 3 **Induced vomiting** (except in cases of syncope, anginal pain or severe cardiac disease).

C Drug Therapy If mechanical measures fail and the attack continues (particularly if the above symptoms are present) drugs should be employed. There is no unanimity of opinion about the most effective drugs but the following are satisfactory.

- 1 **Quinidine Sulfate** U S P B P (see page 200)
- 2 **Neostigmine** U S P (Prostigmin®) 1 mg subcutaneously
- 3 **Digitalis** orally or if no digitalis has been given in the preceding 2 weeks intravenously
- 4 **Procainamide Hydrochloride** U S P (Pronestyl®) (see page 205) Continuous electrocardiograms or continuous monitoring of the heart rate and blood pressure is essential.
- 5 **Mathacholine Chloride** U S P B P (Mechoyl®) 10 mg subcutaneous is often effective but produces very unpleasant side effects and should rarely be used.
- 6 **Syrup of Ipecac** U S P 4 to 6 cc may be used to induce vomiting. It may be repeated if unsuccessful.

Prevention of Attacks

- A** Attempt to find and remove the cause especially emotional stress, undue fatigue or excessive use of alcohol or tobacco.

B Drugs

- 1 **Quinidine Sulfate** U S P B P 0.1 to 0.6 Gm (3 to 9 gr) 4 to 6 times a day may be used to prevent frequent and troublesome attacks. Begin with small doses and increase if the attacks are not prevented and toxic effects do not occur.
- 2 Should quinidine fail or if it is not tolerated full digitalization followed by digitalis in maintenance doses may prevent or decrease the frequency of attacks (see page 187).
- 3 **Procainamide Hydrochloride** U S P (Pronestyl®) in a maintenance dosage of 250 to 500 mg 4 to 6 times a day may be tried if the above methods are unsuccessful.

NODAL PAROXYSMAL TACHYCARDIA (code No. 422)

This resembles atrial tachycardia except that the ectopic focus is in the A-V nodal tissue. At times the electrocardiographic or clinical distinction between atrial and nodal paroxysmal tachycardia is not possible in which case the term supraventricular tachycardia is used. Treatment is carried out along the same lines as for atrial tachycardia (see page 173).

ATRIAL FLUTTER

(Paroxysmal code No 423) (Chronic code No 424)

This a rhythm is due to impulses which arise from an irritable focus. Atrial muscles at rates of 250 to 350 per minute. The ventricular rate is usually one half the atrial rate (2:1 conduction) but it may be 1:1 (3:1 or 4:1 conduction) or very rarely a 1:1 conduction may occur with a very rapid ventricular rate. The ventricular rate is usually regular but if there is a significant A-V block it may be irregular and may precipitate atrial fibrillation. Atrial flutter usually results from any of the common causes of heart disease and it may occur infrequently in the absence of heart disease. It may be produced by quinidine during the treatment of atrial fibrillation.

Treatment

A Treatment of Paroxysmal Flutter Similar to treatment of paroxysmal tachycardia. Digitalis and quinidine are the drugs of choice. The arrhythmia tends to become established more often than do atrial ectopic tachycardias. Prophylaxis of recurrent attack is arrived at similarly to that described for atrial tachycardia (see page 173).

B Treatment of Chronic Atrial Flutter

- 1 Digitalis is the drug of choice. It increases the A-V block and prevents a 2:1 or 1:1 conduction. A half of the atrial fibrillation sinus rhythm results from full digitalization. If atrial fibrillation remains after it has been produced by digitalis, quinidine sulfate may be added to convert to sinus rhythm. Digitalis may be given by any one of the methods (see page 197). Other medication is usually sufficient although the intravenous route may be used if the situation is critical. Digitalis must often be given in larger doses than are usually required for cardiac failure. When a fixed 4:1 conduction is produced by digitalis a slightly increased dose may convert the flutter to atrial fibrillation or sinus rhythm.
- 2 Quinidine Sulfate: U.S.P. B.P. This drug should not as a rule be used to treat atrial flutter unless the patient is fully digitalized with a slow ventricular rate because of the danger of producing a 1:1 conduction. If digitalis resists in only a 4:1 conduction or produces atrial fibrillation which does not respond usually convert to sinus rhythm. Quinidine may be given (see atrial fibrillation below).

ATRIAL FIBRILLATION

(Paroxysmal code No 425) (Chronic code No 426)

A common arrhythmia due to ectopic impulses arising from the atrium at a very rapid rate (400-500) they are of a very variable electrical pathway. The ventricular rate is always irregular in character usually varying between 110 and 160 but may be slow or faster depending upon the degree of A-V block. The chamber for most usually is the left atrium usually associated with organic heart disease. Usually the mitral valve disease is coronary and hypertensive heart disease and thyrotoxicosis. The prognosis is usually

occur without apparent reason in normal individuals in apparently normal hearts during acute infectious diseases following surgical operations especially of the lungs and particularly in thyrotoxicosis

Treatment

A Treatment of Paroxysmal Atrial Fibrillation

1 Specific treatment

a Digitalis is the drug of choice in paroxysmal atrial fibrillation especially when this arrhythmia occurs in individuals with organic heart disease (particularly mitral stenosis) with rapid ventricular rates or when the symptoms or signs of cardiac failure have appeared. If there is doubt as to whether one should use quinidine or digitalis first digitalis should be given this is because it controls the ventricular rate by producing an A-V block which is the immediate objective of treatment in such a case. The objective of treatment with quinidine is to abolish the atrial ectopic rhythm and it is quite safe to wait until the ventricular rate is brought under control with digitalis. Give full digitalizing doses (see page 197) with the objective of slowing the ventricular rate to 70 to 80 per minute and avoiding toxic manifestations. In paroxysmal fibrillation there is no clear evidence that the use of digitalis will result in established fibrillation.

b In those cases where an attack of atrial fibrillation persists in an otherwise normal heart with a ventricular rate under 180 and with no other symptoms or signs of cardiac failure quinidine sulfate may be used at once to convert the rhythm to sinus rhythm.

If the ventricular rate becomes very rapid or if symptoms of dyspnea, anginal pain or a very rapid pulse are produced conversion with quinidine should be temporarily suspended and digitalis given.

2 Prophylaxis of paroxysmal fibrillation. The principles and procedure are the same as for atrial paroxysmal tachycardia (see page 173).

B Treatment of Chronic Atrial Fibrillation

1 Drugs

a Digitalis. Thorough digitalization is the first step (see page 197). The patient is then usually placed on maintenance digitalis indefinitely. The object of digitalization is to slow the ventricular rate and to improve myocardial efficiency.

b Quinidine Sulfate U.S.P. B.P. Quinidine is used to abolish the ectopic rhythm once the ventricular rate is controlled with digitalis. It potentially has a hard sound and should be used only in carefully selected cases by a physician thoroughly familiar with the drug and by a method which ensures close medical supervision (preferably in the hospital) while conversion to sinus rhythm is being attempted. CAUTION See page 200 for dangers of quinidine.

2 Conversion of chronic atrial fibrillation. Opinion varies but the following indications for conversion of atrial fibrillation serve as a general guide. Each case must be individually evaluated. In general conversion is attempted when either it is

thought that the patient will be better off with sinus rhythm than with atrial fibrillation.

- a. Atrial fibrillation persisting after thyrotoxicosis has been treated surgically or by other means.
- b. Atrial fibrillation of a few weeks' duration in an individual with or only light thyroid disease.
- c. Atrial fibrillation associated with frequent embolophthalmia.
- d. Refractory cardiac fibrillation induced by the treatment of fibrillation with digitalis and the inability to decrease the ventricular rate with digitalis therapy may be obviously excessive.
- e. Atrial fibrillation appearing for the first time postoperatively in patients with a technically successful mitral valvulotomy.

DISTURBANCES OF VENTRICULAR ORIGIN

VENTRICULAR PREMATURE BEATS (cod No 441)

A rhythmia in which top impulses arise from any position in the ventricle to a premature beat. It is one of the most common arrhythmias and fits no individual with which it does not occur in which the occasional ectopic premature beat can be regarded. Multiple ventricular premature beats or those arising from two or more foci the entire series more or less when they are middle divided also they rise the question of defining a pathological series. Ventricular premature beats occurring in no definite connection with the disease especially when they produce symptoms or give place to few days with the general condition. Theymay precede a clinical tachycardia or ventricular fibrillation. This especially true following myocardial infarction. Ventricular premature beats may be associated with anxiety, a sense of palpitation, or fatigue. It is the most common rhythmia resulting from digitalis toxicity.

Treatment

A. Specific Measures

1. Reassurance and good hygiene. If an associated disease is present and if the ectopic beats are of great and prolonged palpitation no specific therapy is indicated. The patient and instruct him concerning the relationship between his symptoms and the palpitation.
2. Adjustment of digitalis dosage. If atrial premature beats precede digitalis toxicity stop the digitalis for 3-5 days or until the sinus rhythm disappears and then resume medication on a smaller dosage. At times however patients with cardiac failure who receive large digitalis may develop ventricular premature beats which not due to digitalis toxicity. It is to be questioned digitalis at once and if the patient is to be withheld digitalis for 1 day and if the digitalis failure without digitalis withdrawal is method.

(see page 182) In these circumstances the ventricular premature beats often disappear as the cardiac failure improves

- 3 Potassium salts 1-3 Gm (15-45 gr) q i d are often helpful in ventricular premature beats of digitalis origin.
- 4 Quinidine Sulfate U S P B P This drug should be used orally to abolish ventricular premature beats when they occur following acute myocardial infarction or when they occur in runs or from several foci in patients with heart disease

VENTRICULAR PAROXYSMAL TACHYCARDIA (code No 442)

A disorder in which impulse arise rapidly and fairly regularly in the ventricle at an average rate of 150-180 per minute. This is usually associated with severe myocardial damage especially myocardial infarction

Treatment

A The Average Case

- 1 Quinidine Sulfate U S P B P 0.4 Gm (6 gr) orally every 2 hours for 3 doses. If the attack is well tolerated and the patient is not in shock. If the attack continues and there is no toxicity from the quinidine increase dose to 0.8 Gm (12 gr) every 2 hours for 3 doses. This usually terminates the attack. If it does not give the drug I V or I M or change to procainamide.
- 2 Procainamide Hydrochloride U S P (Pronestyl®) 0.5-1.5 Gm (7½-22½ gr) orally every 4 to 6 hours may be substituted for quinidine if the latter is ineffective or produces toxic symptoms.

B The More Severe Case (or when other medication has failed)

- 1 Quinidine Gluconate N F 0.8 Gm (12 gr) or 0.5 Gm (7½ gr) of quinidine base may be given I M and repeated every 2 hours for 2-3 doses.
- 2 Procainamide Hydrochloride U S P (Pronestyl®) 0.5-1 Gm (7½-15 gr) may be given I M and repeated in 4 hours.

C The Urgent Case

- 1 Procainamide Hydrochloride U S P (Pronestyl®) 1 Gm (15 gr) given slowly I V at a rate not exceeding 100 mg (1½ gr) per minute. During the infusion continuous electrocardiograms and at least repeated blood pressure determinations are essential. Severe hypotension may result from this medication.
- 2 Quinidine may be given I V as Quinidine Gluconate N F 0.8 Gm (12 gr) diluted with 50 cc of 5% glucose slowly (1 cc per minute) with continuous electrocardiograms and determination of blood pressure.
- 3 Vasopressor drugs for shock. If shock is present as a result of ventricular tachycardia or results from the drug given I V it can be treated with vasopressor drugs as described under the treatment of shock (see page 30).
- 4 Other drugs that have been described as occasionally helpful in ventricular tachycardia include:
 - a Magnesium Sulfate U S P B P 10 cc of a 20% solution I V. Calcium salts should be readily available to counteract magnesium toxicity (see page

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VENTRICULAR FIBRILLATION (code N 445)

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SINO-ATRIAL BLOCK (cod No 416)

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Treatment

None is required generally. The causative factors should be eliminated if possible. The following drugs may be tried:

- 1 Atropine Sulfate U S P B P 0.6 mg (1/100 gr) q i d orally
- 2 Ephedrine Sulfate U S P Ephedrine Hydrochlorid B P 25 mg (3/8 gr) orally q i d

SINUS ARRHYTHMIA

Waxing and waning of the cardiac rate during the various phases of respiration. It is a normal phenomenon especially in childhood. Its main importance is its possible confusion with some important arrhythmias.

ATRIO-VENTRICULAR BLOCK

(Complete code No 436)

(Prolonged Conduction code No 434)

(Incomplete code No 435)

Delay in conduction through the A-V junctional tissues. The block may vary from mere prolongation of conduction time through progressive A-V block with varying degrees of block (2:1, 3:1, 4:1 conduction) to complete heart block (A-V dissociation). If complete heart block appears suddenly or if the ventricular rate slows abruptly in the presence of complete heart block, syncope may occur (Stokes-Adams syndrome).

Atrio-ventricular block occurs infrequently in normal hearts; it is usually due to organic heart disease. In young individuals it most commonly is due to rheumatism, fever, or diphtheria. In older patients coronary heart disease is a more common cause. Atrio-ventricular conduction defects may be caused by digitalis or quinidine therapy.

Treatment

In the absence of Stokes-Adams syndrome (see below) treatment of atrio-ventricular conduction defects is rarely accomplished except by elimination of drug if they are causative or by the subsidence of acute myocarditis. Prolongation of the atrio-ventricular conduction per se needs no treatment unless there is complete heart block with ventricular rate below 35/min. Cardiac failure or weakness may occur with slow ventricular rate. Ephedrine or Isoprenaline Hydrochloride U S P (Aldrin® is preferred) (see p. 181) should be given to increase the rate of the ventricular pacemaker.

STOKES-ADAMS SYNDROME (code N 455)

This syndrome refers to attacks of syncope as a result of ventricular standstill or, more rarely, ventricular tachycardia or fibrillation, which occurs when an individual with no malatrio-ventricular conduction or one with a 2:1 atrio-ventricular block changes to a complete atrio-ventricular block. It is very serious.

and then a dose of death is common. If cardiac standstill is prolonged for more than 15 minutes, survival is very unlikely. If the heart rate in complete heart block suddenly slows to under 20 an attack may be induced or cardiac fibrillation may result.

Treatment

Try to eliminate the attack. The object of treatment is to obtain an diastolic rate make a change at a rate of 33/min or more.

- 1 Ephedrine Sulfate U.S.P. Ephedrine Hydrochloride
 $\frac{1}{2}$ P-25-50 mg ($\frac{3}{8}$ to 1 gr) orally 4 times a day if necessary.
 The dose must be sufficient to prevent the attack. If necessary Secobarbital Sodium U.S.P. (Seconal[®]) 30 mg ($\frac{1}{2}$ gr) may be given with a half of ephedrine.
- 2 Isoprenaline Hydrochloride U.S.P. (Aluprin[®] Isuprin[®])
 5-15 mg ($\frac{1}{12}$ to $\frac{1}{4}$ gr) may be given bilingually 4 times a day or 4 times a day.
- 3 Epinephrine Injection U.S.P. If attack is frequent and
 aortic controlled by the above pinphrine 0.5% (8 min)
 of a 1:1000 solution may be given every 5 hours as needed or
 0.2 cc (3 min) of a 1:1000 solution may be given subcutaneous
 every 2 hours.
- 4 Intracardiac Epinephrine Injection U.S.P. 0.5 cc (8 min)
 of a 1:1000 solution may be tried if cardiac standstill persists.

BUNDLE BRANCH BLOCK (code No 437)

(Right code No 4442 x37) (Left code No 4443 x37)

I prefer to treat with codeine though the right of a bundle of His. This is usually associated with organic heart disease but may occur in apparently normal individuals (especially right bundle branch block).

Examination

The only specific treatment for bundle branch block. Treat the underlying disease.

CONGESTIVE FAILURE

(Cardiac Insufficiency code No 404)

Congestive failure is a disorder of the circulatory system caused by the failure of the heart as a pump. Many of the symptoms and signs are due to the congestion of the tissues and the fluid. The heart has been called the "pump" of the body. The heart is a muscular organ which pumps blood out to the rest of the body. When the heart fails, however, the blood is not pumped out to the rest of the body and the blood is not pumped out to the rest of the body. The blood is not pumped out to the rest of the body and the blood is not pumped out to the rest of the body.

Diagnosis

Symptoms and signs include dyspnea, fatigue, and finally orthopnea and a reduced functional capacity. Primary vascular stagnation with lung congestion and malnutrition.

increase in weight venous engorgement with increased venous pressure a prolonged circulation time tender engorgement of the liver dependent edema and at times sacites

Congestive failure may be the end result of a wide variety of different types of heart disease and is therefore a functional diagnosis. The etiologic diagnosis must be made separately (e.g. rheumatic hypertension or coronary disease). Cardiac failure is often classified as acute or chronic and left sided or right sided. These divisions while often helpful are often arbitrary and may coexist.

Treatment

A Objectives of Treatment To increase the strength and efficiency of the myocardial contraction and to reduce the abnormal retention of sodium and water. The patient shares a significant responsibility in the management of his disease because treatment is long term and involves restrictions in diet and activity and because the patient's well being and productivity depend to a great extent on his willingness to cooperate.

B Correction of Causative Factors

1 Eliminate cardiac causes of cardiac failure Cardiac failure may be reversible therefore in addition to carrying out the therapy to be outlined below specific search should be made for non cardiac causes of failure. These include thyrotoxicosis anemia myxedema nutritional disturbances (especially vitamin B deficiency) arteriovenous fistulae polycythemia vera and Paget's disease.

2 Eliminate precipitating factors Determine and eliminate if possible the factor precipitating the cardiac failure. Knowledge of the precipitating factor is important in treatment and in evaluating prognosis. The common factors precipitating failure include infection (particularly respiratory), over exertion, increased sodium intake, discontinuation of medication (especially digitalis), onset of arrhythmia particularly with rapid ventricular rates (e.g. atrial fibrillation), myoanemia, dialysis, anemia and unknown factors.

C General Measures

1 Rest Rest in bed or sitting in a chair serves to decrease the work of the heart and to promote sodium diuresis. Morphine or barbiturate indicated as a welcome relief to a patient who has spent many sleepless dyspneic nights with his disease. Adequate rest should be maintained until compensation has occurred and then should be replaced by progressive ambulation. Most patients can sit at bedside comfortably with no more effort than is required for a bedpan.

Cardiac patients at bed rest are prone to develop phlebitis (See page 217 for prophylaxis). The duration of rest should be as long as necessary to permit the heart to regain reserve strength but should not be unduly prolonged so as to cause generalized debility of the patient.

2 Diet At the onset of therapy if equal (4-6) small bland low caloric low residue meals with vitamin supplements are indicated. Restriction of sodium varies only in degree. Evaluation of the previous intake of sodium will provide a baseline upon which to gauge the degree of restriction required. Before drastic sodium restriction is instituted the

function has been almost definitely ruined if the kidneys can no longer excrete (See page 187 for low sodium syndrome). In an occasional case 350 mg (5½ gr) or less of sodium may be the maximum tolerated without development of edema although sometimes the restriction is usually necessary only when fluid is still at treatment. Vitamin supplements may be indicated. Restrictive diets and anemia may lead to malnutrition and avitaminosis with a superimposed beriberi type of failure.

3. Digitalis (page 195) Digitalis increases the mechanical efficiency of the heart. In congestive failure cardiac output decreased, cardiac and ventricular distol pressure and a fall in right atrial and peripheral venous pressure follow digitalis treatment in patients with a diastolic failure. The glycosides available are qualitatively similar. They differ in speed of action, dosage, rate of excretion. It is advisable to be somewhat familiar with the parenteral and a rapid oral method. Rapid digitalization is indicated in atrial fibrillation with fast ventricular rate and in acute pulmonary edema otherwise low digitalis tonics preferred (F method and dosage see page 197).

4. Removal of sodium and water (See page 205)

a. Mercurial diuretics Mercurial diuretic (CAUTION see page 187-204) by decreasing the sodium and chloride reabsorption in the renal tubule. Clinical effect is noted in about 2 hours by the intramuscular route and is largely complete in 10-12 hours. Small quantities of mercurials (0.5 to 1 mg) may result in digitalis toxicity and should be started initially. They should be used in the morning so that their effect will have fully subsided by night. Large doses may initiate massive diuresis with extensive fluid and electrolyte losses. This can be very distressing and can produce untoward symptoms particularly in the older age group. The toxicity of the mercurial diuretic is potentiated by giving Ammonium Chloride U.S.P. B.P. 2 Gm (30 gr) 4 times daily on the day before and on the day of administration. The use of ammonium chloride for periods longer than 48 hours has no particular advantage and increases the danger of acidosis. The same is true of Acetazolamide N.N.B. (Diamox®) given 0.25 Gm twice daily for 2 or 3 days before the mercurial.

Merapton in Sodium N.N.D. (Thiomide®) and phenylmercurial diuretic N.N.D. (Mercuride®) may be used but the patient may be taught to inject them slowly with the mercurial. The potential toxicity of the mercurial dosage by high weight gain. Close medical supervision is necessary to minimize the possibility of infection, dehydration and especially in the presence of renal and hepatic disease.

The mercurial diuretics may give very rapid results until the patient is dehydrated and diuresis has developed and his dry weight is reached. Particular care should always be exercised to gain and maintain a low sodium and hypokalemia (see page 15) which may occur.

particularly in patients who receive frequent mercurials while on a low sodium diet

- b Cation exchange resins [Carbacrylamine Resins N N D (Carbo Resin[®])] These substances are synthetic macromolecular compounds which undergo ionization and exchange ions for ions of similar charge. The acid potassium cation combination is probably best for cardiac failure. Resins are of greatest value in patients in whom urinary excretion of sodium is low and response to mercurials is poor. Eight Gm (120 gr) in a glass of water before and after each meal is the usual dose. The diet should contain 1.5-2 Gm (22½-30 gr) of sodium to achieve the most efficient use of resins and to prevent potassium depletion. Because the tendency to acidosis is increased, resins should be avoided in renal disease. The hazards of resin therapy are hyponatremia, hypokalemia, and acidosis. These hazards are minimized when the patient eats his full diet; if necessary, potassium salts can be given orally. The danger of calcium depletion during resin therapy is slight.
- c Paracentesis. Paracentesis of fluid in the chest and abdomen should be undertaken if respiration is embarrassed. Since sodium retention may occur as a result of fluid collections in the chest, abdomen, and legs, diuretics may occur following the procedure.
- d Mechanical measures. Venesection (in low output failure in the absence of anemia), Southey tubes, and acupuncture may be beneficial if the ordinary forms of treatment fail. Southey tubes and acupunctures are especially valuable in severe right heart failure with obstinate dependent edema. Care must be taken to avoid a severe low sodium syndrome with hyperkalemia.

- 5 Cool environment. Patients are usually more comfortable in a cool room.
- 6 Fluids. If sodium restriction is observed faithfully, there is no need for restriction for fluid restriction.
- 7 Exercise. Patients who are in bed should be given passive or active leg exercises to prevent thrombosis (see page 217).
- 8 Sedation. Patients with congestive failure may also experience insomnia. Use sedation carefully to ensure sleep.

D Therapeutic Myxedema. Useful in chronic resistant left ventricular failure, resistant anginal pain, uncontrolled ventricular rate in atrial fibrillation, and in frequent recurrences of atrial flutter or tachycardia not controlled with quinidine. It is successful in about 40% of well-chosen cases but is essential for the patient and should not be undertaken lightly. Myxedema is unpleasant and the cure may be worse than the disease.

Any of the measures used to treat the hypothyroidism may be employed (see page 370).

Observation During Treatment of Cardiac Failure

A careful clinical record should be kept of all patients being treated for cardiac failure so that their course can be fully followed and therapeutic changes made as needed. This record should include the following observations on every visit:

1. Signs of original symptoms
2. New symptoms
3. Monitoring weight with same clothes
4. Presence of the signs of congestive failure (venous engorgement and pulsations peripheral edema pleural effusion enlargement of the liver presence of rales)
5. Examination of the central blood vessels (cardiac sounds normal rhythm for the cardiac rhythm and apical rate cardiac apex peripheral palpitation and state of the veins)
6. Blood pressure and pulse rate of pulse altans

ACUTE PULMONARY EDEMA (cod No 324)

Acute pulmonary edema is a general emergency. Proper understanding of the precipitating factor and underlying disease is necessary for the physician to utilize the most appropriate possibilities in the individual case (e.g. in a mild attack morphine and rest in bed alone may suffice in an attack due to trivial fibrillation with rapid ventricular rate in a toxic cardiac patient given intravenously may take place of some of the therapeutic measures to be followed).

Emergency Treatment

- A. Position: The patient should be elevated to the semi Fowler bed position (see page 3) or placed in a chair thus decrease the venous return to the heart.
- B. Morphine Sulfate U.S.P. B.P. 15-30 mg ($\frac{1}{4}$ to $\frac{1}{2}$ gr.) I.V. or I.M. It relieves anxiety decreases pulmonary congestion and induces sleep. The attendant is watching of the respiratory depression. It decreases the negative intrathoracic pressure and the venous return to the heart.
- C. Oxygen when available should be administered in high concentration. This is best achieved by mask or in the case of child by hood or tent. Moderate concentration (40 to 60%) can be achieved by oxygen tent or nasal catheter. Oxygen relieves hypoxia, dyspnea and decreases pulmonary capillary pressure (see page 144).
- D. Reduction of Blood Volume
 1. Tourniquet: Soft rubber tourniquets on blood pressure cuffs applied with sufficient pressure to obstruct venous but not arterial flow distended every 15 minutes will effectively decrease the venous return to the heart. The tourniquet should be removed gradually as the attack subsides. Approximately 700 ml blood may be trapped in the extremities by this method.
 2. Venous occlusion (300 to 700 cc). This is the most direct way of reducing the venous return to the heart and may temporarily relieve the distention of the peripheral vessels in low tension distention. This occlusion should not be done if a embolism is present.
- E. Rapid digitalization if gratified (see page 197). If time is short should be considered in giving digitalis intravenously to a previously digitalized patient.

- F Aminophylline** U S P B P 0 25 0 5 Gm (4 7½ gr) slowly I-V has been advocated. Oral aminophylline is relatively ineffective. 1 M aminophylline is often painful. Rectal aminophylline suppositories 0 25 0 5 Gm (4 7½ gr) may be helpful.
- G Hexamethonium** In the acute pulmonary edema of hypertensive heart disease and in the presence of severe hypertension a slow intravenous infusion of hexamethonium 1 mg (¼60 gr) per minute to a dose of about 5 to 10 mg (¼12 ½ gr) may be very helpful. The infusion should be stopped when the systolic pressure falls to 170 mm Hg so as not to overstep the mark and produce hypotension.

REFRACTORY CARDIAC FAILURE

The refractory state is said to be present when the patient fails to obtain clinical improvement after the usual therapeutic measures outlined above. When this occurs the following procedure is advised:

1. Re-evaluate the total situation. Has the bed rest been adequate? Is the patient ingesting more sodium than ordered? Has he been receiving his therapy carefully? A review of the patient's activities, diet, and medications is essential.
2. Are unrecognized recurrent pulmonary infection, anemia, masked hyperthyroidism, vitamin deficiency, aortic myocardial infarction, or arrhythmia present?
3. Have complications such as acute rheumatic myocarditis or subacute bacterial endocarditis been superimposed upon a rheumatic heart?
4. Are there electrolyte abnormalities which may have resulted from diuretics and resins if these have been used? Electrolyte disturbances may lead to mercurial resistance, produce a low sodium syndrome, or in the case of potassium enhance digitalis intoxication.

MANAGEMENT OF CONVALESCENCE

Specific Measures

- A Digitalis** Once digitalis is instituted it is usually necessary to continue the administration of the drug for life (see page 185).
- B Low sodium Diet** 1 5 Gm (22½ gr) NaCl (750 mg or 12 gr Na) per day (see page 53). It is advisable to check the patient's serum sodium or urinary sodium frequently to be certain that no deficiency is occurring. An inadequate sodium intake in the presence of severe renal impairment can precipitate fatal renal failure.
- C Mercury** These drugs should be used as frequently as indicated even as frequently as 2 to 3 times per week in prolonged maintenance in order to remove any accumulating edema (see page 204). Care must be taken not to cause sodium depletion or dehydration. Some patients will prefer the addition of salt to the diet as long as mercurials will remove fluid from the body. Many patients can be saved from severe chronic cardiac

invalidated by the liberal but judicious use of mercurials. Ammonium chloride may be given orally to potentiate the mercurials (see page 304).

General Measures

Provide adequate rest and exercise within tolerance. Careful attention should be paid to the treatment of the underlying cardiac cause of cardiac failure (see page 182) and to the avoidance of precipitating factors (see page 182).

ELECTROLYTE DISTURBANCES IN CARDIAC FAILURE

During treatment of cardiac failure the type of electrolyte disturbance may be as follows:

Hypochloremia: Alkalosis

A Mechanism. This is due to chloride excretion out of proportion to sodium loss following diuretic use. This produces a low serum chloride and a high serum bicarbonate. Serum sodium and potassium levels may be normal or low. Symptoms of dehydration may be present: dry mouth, mucous membranes and loss of turgor and a latent or manifest tetany.

Treatment

1. Ammonium Chloride U.S.P. B.P. 4.6 Gm (1 1/2 dr) per day for 3 to 4 days and repeat after a rest interval of 3 to 4 days.
2. Potassium salts may be added if a deficit exists (see below). If tetany persists, calcium salt must be given concurrently (see page 302).

Low Sodium Syndrome

A Diagnosis. The onset of weakness, oliguria, diaphoresis and asthenia heralds the low salt syndrome. It is associated with fever, vomiting and additional predisposing factors. Low serum sodium may be present without alkalosis or acidosis or it may be complicated by dehydration and acidosis. It may follow severe sodium restriction accompanied by mercurial diuresis.

Treatment

1. Mild cases. Increase sodium intake.
2. Severe cases. Treat with I.V. hypertonic saline (see page 15).

Hypokalemia

A Therapeutic effect. Excessive potassium excretion from mercurial diuresis is a toxic side effect (Diuretic[®]) of the use of a diuretic. An anorectic is an important side effect of a low sodium diet. Hypokalemia may induce digitalis toxicity and is manifested by muscular weakness, particularly of the muscles of respiration.

B Treatment. Potassium Chloride U.S.P. B.P. 3.6 Gm (45 gr) daily by mouth provided there is no renal failure. CAUTION: Paralytic potassium salts should not be given in the presence of a digitalis renal failure.

PERICARDITIS

ACUTE FIBRINOUS PERICARDITIS (code No 420)

Acute fibrinous pericarditis may be caused by or associated with many diseases. The most common are rheumatic fever, uremia, collagen diseases, tuberculosis, viruses, and malignant disease. Acute fibrinous pericarditis generally produces little functional impairment for there is no mechanical interference with cardiac function. The most distressing symptom is pain and this may be entirely absent. It varies from local discomfort to very intense pain which is usually substernal or precordial and may be confused with angina or infarction.

Treatment

Treat the underlying condition and provide analgesics as necessary for relief of pain. Salicylates and/or corticotropin (ACTH) or the cortisones are useful in the acute pericarditis (see page 518).

PERICARDITIS WITH EFFUSION (code No 420 100 8)

The diagnosis of pericarditis with effusion is important because the fluid accumulation may cause decreased cardiac output and venous return resulting in cardiac tamponade. This does not respond well to the usual treatment for cardiac failure (digitalis, low salt diets, etc.) but removal of the pericardial fluid may be lifesaving. This is infrequently required in the common varieties of pericarditis with effusion with the exception of tuberculous pericarditis. Both the rapidity of accumulation and the amount of fluid are important in determining the functional impairment.

Diagnosis

Symptoms and signs include apprehension, dyspnea, cyanosis, distended neck vein, tachycardia, pulsus paradoxus, increase of area of cardiac dullness, fixed or absent apex beat and diminished heart sounds. Pericardial friction rub may be present. The chest x-ray reveals a water bottle shaped heart shadow. The ECG shows low voltage of the QRS complex and T wave abnormalities. Diagnostic aids include cardiac catheterization or venous angiocardiography. Confirmation is by pericardial tap.

Treatment

A. Emergency Treatment (Paracentesis) The indications for pericardial paracentesis are the symptoms and signs of cardiac tamponade. As the pericardial fluid increases in amount and particularly when it increases rapidly, the venous pressure may rise considerably and the cardiac output may progressively fall. When this occurs the patient becomes weak, pale and dyspneic, the pulse pressure becomes very narrow and the pulse rapid and thready. If the patient goes into shock, under these circumstances the removal of the pericardial fluid may be lifesaving. The fluid should be removed slowly to avoid cardiac dilatation or serious cardiac reflexes.

1. Sites of puncture Avoid puncture of the ventricular muscle

- a. Left 5th or 6th inter-space about 1 cm within the area of cardiac dullness or 1-2 cm inside the left heart border along the mid-clavicular line (usually 7-8 cm outside of left mid-clavicular line). The needle is pushed slowly inward and slightly upward. If effusion is present one should find fluid within 3-5 cm (at times 7-8 cm).
- b. Epigastric area. Area between xiphoid process and left mid-clavicular margin. Insert the needle upward at an angle of about 45° and pointed toward the midline. The pericardium is reached about 3-4 cm.
- c. Posterior approach. To be used, as a rule, only when the above approaches are unsuccessful rarely used if one is up to the middle of the chest. On the 7th or 8th inter-space in the mid-scapular line. The left arm is elevated to clear the scapula out of the way. The needle is directed inward and medially.

2. Equipment

- a. No. 18 or 19 needle with short bevel and fitting stylet
- b. No. 28 or 27 needle to infiltrate the skin with procaine
- c. 20-30 cc syringe to remove fluid. Syringe should be connected to needle by a 4-inch piece of rubber tubing to prevent accidental movement of the needle.

3. Technique

- a. Clean and sterilize skin over area to be punctured.
- b. Drape surrounding area with sterile towel.
- c. Infiltrate skin with 1-2% procaine solution.
- d. Insert needle (detached from syringe and without a stylet) slowly into skin following direction according to site selected (above).
Withdrawal of fluid. When the fluid is removed it must be withdrawn very slowly. Sudden withdrawal of the fluid may result in acute cardiac dilatation followed by death. The removal of fluid is able to relieve half the amount of fluid withdrawn with air both to prevent excessive dilatation and to relieve vital capacity of the process by x-ray. With the needle in place move the collection point after the withdrawal of each portion inject 10 cc of fluid.
f. After the needle is removed a simple bandage over the puncture is adequate.

B. Specific Measures

1. Treatment of pericarditis (code No. 420.123). The current treatment is to treat the systemic infection with bed rest, attention to nutrition, diathermy, sulfonamide and intravenous antibiotic sulphonamide therapy (see p. 131). If the fever and signs of pericardial effusion do not rapidly subside and are still obvious in 2-3 months a gradual re-accumulation of the pericardial fluid should be considered in order to prevent chronic constrictive pericarditis. Judgment is required to determine when the disease is progressing despite medical treatment and when signs of organization appear.
2. Rheumatoid pericarditis with effusion (code No. 420.196.8). Treatment for rheumatoid fever. The salicylate may help in

190 Chronic Constrictive Pericarditis

causing fluid resorption. Paracentesis is usually unnecessary but should be performed if tamponade occurs.

- 3 Hydropericardium due to heart failure (code No 420 522 8)
Treatment of the congestive failure is usually sufficient.
- 4 Hemopericardium due to rupture of adjacent structure (code No 420 532) Usually post traumatic. If fluid accumulation is excessive remove fluid at once.

PURULENT PERICARDITIS (code No 420 100 8)

This is usually secondary to other infection elsewhere but is sometimes caused by contamination of a previous pericardial tap.

Treatment

A Specific Measures

- 1 Systemic chemotherapeutic agents. Treat infection with indicated chemotherapeutic agents (see page 514).
- 2 Interpericardial antibiotics. At the time of removal of the fluid instill 50 000-150 000 units of penicillin or the approximate topical amount of streptomycin or other indicated antibiotic into the pericardial sac depending on organisms found (see page 514) and repeat whenever a tap is performed. Chemotherapeutic agents should be continued as long as purulent effusion is present.

B General Measures

- 1 Paracentesis. Perform as needed to relieve pressure.
- 2 Pericardiotomy. If fluid is encapsulated or patient is not responding to therapy surgical drainage may be necessary.

CHRONIC CONSTRICTIVE PERICARDITIS (code No 420 140 4)

(Tuberculous pericarditis code No 420 123 4)

This is usually due to tuberculous pericarditis. In the remainder of cases the etiology is unknown, a few instances occur following acute nonspecific pericarditis or traumatic pericarditis.

Treatment

A General Measures To combat ascites and congestive failure

- 1 Low sodium diet.
- 2 Mercurial diuretics as needed to keep patient dry (see page 204). This may be combined with intermittent ammonium chloride as in cardiac failure.
- 3 Digitalis is usually of little value.

B Surgical Removal of Constricting Pericardium This procedure can frequently restore a patient to normal health. If long standing phenomena are chronic or the pericarditis is progressive surgical intervention is the only method offering possible cure.

NEUROCIRCULATORY ASTHENIA (code No 004 580) (Da Costa's Syndrome or Effort Syndrome)

Neurocirculatory asthenia is a chronic disorder of young adults which is considered to be a psychiatric disorder. It is characterized by functional symptoms: dyspnea on effort, palpitations, left chest pain, and easy fatigability. The symptoms are often more closely related to the emotional commotion of effort than to the effort itself. Examination reveals no clinical findings of heart disease although tachycardia is often present.

Treatment

- A Psychotherapy and Reassurance** The medical examination and the manner of handling the patient is the most important therapeutic value.
- 1 Medical examination should be thorough.
 - 2 The patient should be assured that no organic disease exists.
 - 3 Psychotherapy. Further and more intensive psychotherapy may be of value.
- B Oxygen Measures**
- 1 The treatment of hyperventilation. An acute attack may be relieved by the administration of 5% carbon dioxide or by breathing into a bag or by holding the breath. Do not give ammonium chloride as it does not relieve symptoms and may precipitate a dose inasmuch as a fixed base has been lost. *J. Scumpe's tangier's alkali is*
 - 2 Good hygiene with moderation in all activities as well as balanced diet and proper sleep. Exercise is undesirable on a new trend to suggest it.

Prognosis

The prognosis for survival is good but is often discouragingly poor for relief of symptoms.

PULMONARY HEART DISEASE (Cor Pulmonale)

Heart disease secondary to disease of the lungs of the pulmonary arteries. Emphysema, pulmonary fibrosis, silicosis, and kyphoscoliosis are common causes of right cor pulmonale.

Diagnosis

- A Symptoms** Symptoms of the underlying pulmonary disease may be present along with symptoms of pulmonary hypertension. Preceded by many of the signs of pulmonary hypertension: right ventricular hypertrophy and failure.
- B Signs**
- 1 Signs of pulmonary hypertension. Systolic pulsation and murmur in the pulmonary area. A clear, closely split second sound in pulmonary area. A third, closely split second sound possibly by distention of pulmonary insufficiency.
 - 2 Signs of right ventricular hypertrophy. Heaving right ventricular impulse in the left parasternal area. A tapping pical impulse. A right gallop in the xiphoid area.

- 3 Signs of right ventricular failure follow usually with sinus rhythm and with arterial oxygen saturation less than 85%
- 4 Evidence of central cyanosis and high output state may be present

Treatment

- A Specific Measures Appropriate antibiotic therapy for the respiratory infection that so commonly precedes failure in this type of case. The patient may be afebrile
- B General Measures
 - 1 Intermittent oxygen therapy possibly by positive pressure to increase arterial oxygen saturation and to decrease pulmonary arterial pressure. Continuous oxygen therapy should be avoided and the patient closely observed for stupor and coma since carbon dioxide retention may occur with oxygen therapy in these patients (see page 144). Intermittent positive pressure mask breathing e.g. with the Bennett or Emerson respirators at pressure settings of +10 to +15 (in inspiration) and 0 (expiration) may be helpful. The valve may be operated by an attendant if the patient does not breathe spontaneously. These devices provide a convenient effective method of administering bronchodilators, antifoaming agents and aerosols. They do not restrict cardiac output.
 - 2 In cor pulmonale intermittent positive pressure breathing is the single most effective therapeutic measure.
 - 3 CNS depressants especially narcotics, barbiturates and hypnotics are strongly contraindicated in the treatment of cardiac failure secondary to primary pulmonary disease (cor pulmonale) due to their marked depressant action on the respiratory centre.
 - 4 The usual methods of treatment of heart failure should be used (see page 182): bed rest, restriction of sodium, mercurial diuretics and digitalis. Digitalis may not be effective if there is a high cardiac output state.

CARDIOVASCULAR SYPHILIS

Cardiovascular lesions may manifest themselves as a complicated syphilitic aortitis, syphilitic aortic insufficiency, aortic or fusiform aneurysm of the aorta, or as angiodysplasia due to involvement of the ostia of the coronary arteries.

The diagnosis may be supported by a history of syphilis, evidence of the disease elsewhere in the body (especially CNS syphilis) and a positive serological test for syphilis. Serological tests are negative in about 20% of cases.

Treatment

- A Specific Measures
 - 1 Treat latent syphilis (see page 440)
 - 2 Therapeutic acidosis has the Herxheimer reaction as a rare complication. It is therefore not considered necessary to precede penicillin treatment with sodium bicarbonate.
 - 3 Several subsequent courses of penicillin are advised by some authorities at intervals of 6 months or 1 year especially if the serology remains positive.

B. General Measures

- 1 Bed rest is essential during the course of treatment with penicillin
- 2 Surgical repair of the aneurysm has been attempted but the best results are being in the exploratory stage

SURGERY IN THE CARDIAC PATIENT

Patient's History of Surgery in the Cardiac Patient

- A The usual hazards of surgery are particularly great in a surgery of the cardiac patient shock hemorrhage anoxemia thromboembolism and infection
- B The above hazards may precipitate any of the following coronary insufficiency particularly if the patient has coronary disease as cardiac failure and cardiac arrhythmias

Cardiac Risk of Anesthesia

- A Hypotension following preoperative sedation and induction may precipitate coronary insufficiency and/or arrhythmias
- B Straining during induction increases the work of the heart
- C Anoxia; patient will be restless and may suffer coronary insufficiency cardiac failure increase pulmonary hypertension and arrhythmias

Special Risk Involved in Particular Cardiac Lesion

- A The major hazards are coronary disease aortic disease especially if angina and yaws are present syphilitic cardiovascular disease and Stokess Adams attack
- B Rheumatic Heart Disease With the exception of aortic stenosis the lesions involve heart depending on the functional status of the lesion
- C Hypotension Preoperative Analgesia these patients do not tolerate easily in the absence of anesthesia or if ill
- D Coronary Disease This carries the greatest risk particularly in the first few days after operation (about 3% additional hazard) Postoperative fever may occur if there is significant fall in blood pressure and coronary insufficiency Stokess Adams attack may occur
- E Syphilitic Cardiovascular Disease Especially if associated with angina this lesion gives the element of coronary occlusion and sudden death may occur

Anesthesia in Cardiac Patients

- A Surgical procedure in cardiac patient requires a skill and a technique using one the individual with which he is most experienced
- B Adequate oxygenation must be maintained all time
- C A slow deep operation preferable because of danger of arrhythmias
- D Induction must be smooth
- E A slow hypotension and treat promptly if it occurs

Management of the Syphilitic Cardiac Patient

- A If the patient has had untreated a dual infection postpone surgery for 3 to 6 months except the most urgent cases

- B Postpone surgery for at least 3 weeks after recovery from congestive failure
- C Exercise caution when giving fluids containing sodium (including blood) to avoid producing pulmonary edema
- D Treat anemia prior to surgery
- E Treat malnutrition and avitaminosis especially avitaminosis B prior to surgery

THE CARDIAC PATIENT AND PREGNANCY

Stat a of Pat ient

The following informat on will assist in making an estimat on of likelihood of cardiac fail re

- A Function l class p for to pregnancy
- B Age of patient
- C Size of heart
- D Struct ral lesion of hea t
- E Presence of arrhythmias
- F Socio economic status (e g if children are at home or if the patient must wo k)
- G Intellig nce and cooperation of patient (e g can the patient rest? Can she tay on a low sodium diet?)
- H Presen e of associated disease

Some Factors Which May Pre ipitate Failure in Hea t Disea e

- A Excessive work
- B Upper respiratory infe tion sodium retention
- C Anemia
- D Paroxysmal arhythmia
- E Excessive sodium int k e g diet sodium bicarbonate for gastric acidity infusio s of saline plasma or blood
- F Rheumatic activity

Ass a ment of Risk of Hea t Disea e in Pregna cy

- A Little or No Fun t o al in e pa ty P actically all patie ts who a e asymptomatic or who have only mild symptoms with ordi nary activities may be allowed to contin e to term under lose medical supervis on. If they dev lop more seve e symptoms with activity they should be ho pitalized t ested for fail re and kept in bed until term
- B Moderate or Marked Functional in e p city If the patient has pu e mitral stenosis a d de elop acute pulmonary edema or has moderate to marked symptoms with activity mitral valv lotomy should be consid red. This has been suc cessfully ac complished up to the eighth month. If the patie t does not ha e an operable lesion she hould be hospitalized treated fo cardiac failure and kept in bed u til term
- C Very Marked Fu t o al in e pa ty All pati ts seen duri g the first tr me te who h symptoms on little or no acti ty and who do not have an ope able cardiac lesi n sh uld be aborted because of the high incid ce of r urrent fail re and death in this gro p of patients
- D Sodium should be restricted after the second month

Physiological Load When Pregnancy Imposes on the Heart

The work of the heart increases by about 50% with beginning of both the third month when the blood volume and cardiac output increase. The placenta is as massive as a liver. Cardiac failure may occur at any time from the end of the first trimester up to 2 to 3 weeks before term at which time the likelihood of an accurate blood count rises.

Management of Labor

- A C-section opinion holds that vaginal delivery is to be preferred except in those cases in which there is an obstetrical indication for cesarean section. Contraction of the uterus may be the only exception to vaginal delivery because of the danger of rupture of the uterus.
- B The section should be made as short as possible using forceps when possible.
- C Ergonovine Maleate U.S.P. (Ergostat) should probably be avoided because of the increased work of the heart which follows.

CARDIOVASCULAR DRUGS

DIGITALIS AND DIGITALIS LIKE PREPARATIONS

Action of Digitalis and Digitalis like Preparations

- A It is generally held that digitalis exerts its effect on the myocardium through an increasing efficiency of the heart. Digitalis insignificantly increases cardiac output decreases right atrial pressure decreases the renal venous pressure and in consequence of sodium and water and so estimates some of the hemodynamic administration of digitalis in the treatment of congestive heart failure. The increased cardiac output causes decreased venous pressure how ever a direct effect on the venous motor system has also been postulated.
- B In the arrhythmias (especially atrial fibrillation and flutter) digitalis slows conduction between atrium and ventricle depresses the S.A. and A.V. nodes both by direct action and by stimulation of the vagus nerve.

Principles of Administration

- A Concept of Digitalis Saturation (Digitalization) Digitalis must be administered usually in a graded manner in order to achieve the saturation and obtain a therapeutic effect. After digitalization has been accomplished the maintenance dose preceding the amount of digitalis administered should be administered daily a long indication of digitalis per se (usually for life).
- B Criteria of Adequate Digitalization Digitalis is administered until a therapeutic effect has been obtained (e.g. relief of congestive failure or slowing of the ventricular rate in atrial fibrillation) or the earliest toxic effect (anorexia) is evidenced. Congestive failure with normal rhythm. Diuretic therapy is adequate if edema fluid is eliminated.

- b Cardiac size is decreased as dilatation becomes less
- c Venous pressure and circulation time return to normal
- d Decrease of heart rate results if increase was due to failure

e Engorged tender liver becomes smaller and non tender

- 2 Atrial fibrillation When the rate is below 100 after exercise one can usually consider the patient adequately digitalized. The following simple exercises are adequate

a Bed patients Sit up 5 times

b Ambulatory patients - Hop up and down on one foot 5 times

- 3 Ecg effects The most characteristic change which digitalis produces in the Ecg is sagging of the ST segment and displacement of the T waves in a direction opposite to that of the main deflection. Later there may be a prolonged P R interval. The ST T changes cannot be used as criteria of digitalis toxicity for the effects appear before saturation is present and persist for 2 to 3 weeks after digitalis has been discontinued. However the Ecg is often of value in determining whether digitalis had been administered in the past 2 to 3 weeks and may give one an idea of the amount

- C Toxic Effects of Digitalis There are no non toxic digitalis preparations and the difference between the therapeutic and toxic level is very small

1 Slight toxicity Anorexia

2 Moderate toxicity Nausea and vomiting headache malaise

3 Considerable toxicity Diarrhea ectopic beats (especially ventricular) blurring of vision confusion disorientation

4 Gross toxicity Severe diarrhea abdominal pain high degree conduction blocks and atrial or ventricular fibrillation

- D Relationship of Digitalis to Potassium Ion Recent work indicates that there is an antagonism between potassium and digitalis and that digitalis toxicity is more likely to occur in any clinical disorder in which decreased potassium of the cell or of the serum is present. This may occur with potassium deficiency from mercurial compounds following cortisone therapy or in any condition in which deficiency of serum potassium is produced. In the circumstances the dose of digitalis should be reduced or potassium should be given.

- E Treatment of Severe Digitalis Intoxication Omit digitalis completely until the intoxication has subsided and treat the cardiac failure with other means. Give potassium salt 4 to 8 Gm (60 to 120 gr) orally per day in divided doses depending upon the clinical urgency well diluted intravenously as potassium salts slowly (not more than 10 to 20 mEq/hour).

The differentiation of digitalis toxicity and of acute digitalization is sometimes quite difficult. The only safe procedure if uncertain is to omit digitalis and treat the cardiac failure with resuscitation of sodium mercurial diuretics and other means to improve the cardiac function. If necessary omitting or arrhythmias which are suspected of being due to digitalis are in fact due to digitalis they will subside in 2 or 3 days if digitalis is stopped. The use of rapid acting intravenous

digital preparations differ entiate these two clinical states is not advised because of the risk involved

- The cardinal principles of digitalis therapy remain the same whether one uses a crude drug such as the whole leaf or one of the purified glycosides. They all have broadly similar pharmacological actions differing only in the extent of the therapeutic effect. The differences may be utilized to advantage in the treatment of the individual patient particularly with respect to potency speed of action extent of absorption and duration of action.

Indications for Administration

A Indications for Administration of Digitalis

- 1 Cardiac failure or combined with the other sinus rhythm or atrial fibrillation
- 2 Atrial fibrillation or flutter with a rapid ventricular rate
- 3 Supraventricular paroxysmal tachycardia
- 4 Prior to cardiac surgery especially mitral valvulotomy in patients with sinus rhythm so that if paroxysmal atrial fibrillation occurs during or following surgery the ventricular rate will not become excessively rapid
- 5 The prevention of paroxysmal atrial fibrillations in patients in whom quinidine has failed or cannot be tolerated

B Risks of Administration

- 1 Overall digitalis toxicity is increased in all cases when ever digitalis is needed and prevents administration of a satisfactory dose
- 2 Potential administration
 - (1) Atelectasis pulmonary oedema therefore fail
 - Caution should be used in giving the full digitalising dose in a sick elderly patient especially under these circumstances. The drug should be given slowly in divided doses
 - (2) Treatment of atrial fibrillation when then needed for control of the ventricular rate is urgent
- 3 Inability to take digitalis orally. Nausea and vomiting due to any cause must be postoperative

Method of Digitalisation

A Utteridge's When the patient has received digitalis

■ Preparation in the preceding weeks

- 1 Parenteral digitalisation (indicated) **CAUTION**
Never administer a full digitalising dose I.V. unless it is certain that no digitalis has been taken in the preceding two weeks. Always give I.V. preparations slowly
 - a Select drug and schedule according to rapidity of effect needed
 - b Initial dosage should be kept in mind because of the therapeutic average digitalising dose in a given case. A good general rule is to give $\frac{1}{2}$ to $\frac{2}{3}$ of the average digitalising dose immediately and follow with the remainder in 24 hours. Observe fully for digitalis toxicity (page 198)
 - Addition of oral digitalis. At the time that the initial dose is given parenterally it is advisable to give orally

DIGITALIS AND DIGITALIS LIKE PREPARATIONS

Qty id	P p tions A b b	Digitalis mg D	M th d r Administ II	Sp d f Ma imum A tion and Dur tion	Maint name D
Oubal U S P B P	1 amp 1 0.25 mg (1/240 gr)	0.25 0.5 mg (1/240 1/120 g)	0.25 0.5 mg (1 2) dil t d in 10 all el wly I V f flow with anoth d g l b low	1/2 1 1/2 h a d tian	Not u ed f maint anc
De la oaid U S P (C dil nld D)	3 and 4 amp 1 0.4 and 0.8 mg (1/150 d 1/75 gr)	0.4 (1.6 mg) (1/150 g)	0.4 (1.2 mg) I V I M and f ll w 0.8 (2.4 mg) I V I M	2 4 d y	
Dig t (C dil nld D)	1 and 2 amp 1 0.2 and 0.4 mg (1/300 and 1/150 gr)	1.2 mg (6) (1/60 g)	0.6 mg (3) I V I M f ll w d by 0.2 0.4 mg q 4 h ure till 1 3	1 1/2 d r tion 3 8 d y	(0.2 0.4 mg) (1/300 1/150 gr)
Dig in U S P B P (Dilut b f)	1 amp 1 0.5 mg (1/120 gr)	1 1/2 mg (3) (1/40 g)	1 mg (1) I V I M f ll w d (1) (1/120 g) in 2 4 h mg (0.5) (1/240 gr) q 3 4 hou s until f e t l e b l a i n d	3 8 1 e d t i n 14 21 d y	0.5 0.2 mg (1/240 1/120 g)
Digitalis U S P B P	0.03 0.06 and 0.1 Gm tabl t (1/2 1 and 1 1/2 g)	1 0 1.5 Gm (13 22 1/2 gr)	0.6 Gm (10 g) t 0.4 Gm (6 g) in 6 8 h 0.2 Gm (3 g) q 6 h f 2 3 d th n o t Gm (1 1/2 g) b 1 d til f e t l e b l a i n d	6 8 h a d t i o n 19 21 day	0.03 0.2 Gm (3/4 3 0 gr)
Dig t U S P B P	0.1 0.2 mg t bl t (1/2 1 1/2 1/120 g)	1.2 mg (1/50 g)	0.6 mg (1/100 g) t and ep t in 12 hou and th 0.2 mg (1/220 g) b 1 d til f e t l e b l a i n d	6 8 h d t i n 14 21 d y	0.03 0.2 mg (1/200 1/100 gr)
Dig t U S P B P	0.25 0.5 and 1.0 g (1/240 1/120 d 1/60 gr)	2 5 mg (1/20 1/10 gr)	1 mg (1/100 g) t d th g 0.5 0.75 mg (1/220 1/120 g) q 6 h T 1.5 mg (1/20 g) 3 5 mg (1/20 g) t 1 mg t 8 h th 0.5 mg q 6 h until	4 8 1 d t i 2 4 d y	0.15 0.50 mg (1/400 1/200 g)
Dig t U S P B P (C dil nld D)	0.5 mg tabl t (1/120 g)	7.5 mg	0.5 mg (1/20 g) t 1 mg t 8 h th 0.5 mg q 6 h until	2 4 d y	0.5 2.5 mg (1/20 1/25 g)

PARENTERAL

a stage maintenance dose of the preparation used. If the patient is able to swallow. By instituting the drug orally early optimum digitalization can be achieved and maintained from the start. It is not necessary to give the same digitalis glycoside orally as is used for the initial medication (e.g. many digitalis with I.V. lanatoside C and give digitalis folium for maintenance).

- d Caution must be exercised. A previous history of digitalis therapy is often difficult to obtain because the new preparation is at least less and may be in tablets of various colours. The patient may be unaware of the therapy he has been receiving.

Digital toxicity has been seen in patients who have denied or were unaware of having received the drug. This is another reason for avoiding a full digitalizing dose in a single injection.

- e Individualize course of each patient. No dosage schedule will fit all patients.

- 2 Rapid oral digitalization (within 24 hours). A single oral digitalizing dose is usually unwise since nausea and vomiting are common making estimation of degree of digitalization very difficult.

Multiple oral doses are usually quite adequate and rapid if carefully followed. In all cases close medical supervision is required for each dose. As digitalization is progressive the drug should be stopped at the first sign or symptom of toxicity (p. 106).

Oral Administration of the Digitalis Drugs

U n g y	D r u g	How Administered
Mod erate	Digitalis	0.4 Gm (5 gr) q 8 hours for 3 doses
	Digitalin	0.4 mg (1/150 gr) q 8 hours for 3 doses
	Digitalin	1.0 mg (1/50 gr) q 8 hours for 3 doses
Inter mediate	Digitalis	0.2 Gm (3 gr) tid for 2 days 0.1 Gm (1 1/2 gr) qid for 3 days
	Digitalin	0.2 mg (1/500 gr) tid for 2 days
	Digitalin	0.5 or 0.75 mg (1/120 or 1/80 gr) tid for 2 days 0.25 or 0.5 mg (1/240 or 1/120 gr) qid for 3 days
Late	Digitalis	0.1 Gm (1 1/2 gr) tid for 4-5 days
	Digitalin	0.1 mg (1/500 gr) tid for 4-5 days
	Digitalin	0.25 or 0.5 mg (1/240 or 1/120 gr) tid for 4-5 days

- 3 Slow digitalization. At times it is impossible to digitalize slowly over the few weeks especially if the patient cannot tolerate the drug. In such cases the drug may be given in daily doses of 0.3 Gm with a range in maintenance dose of 0.5-1 Gm. The total digitalizing dose may be somewhat less than when rapid digitalization is accomplished. One must individualize

DIGITALIS AND DIGITALIS LIKE PREPARATIONS

Glycolid	P p ti	Digit li mg	Method f	Sp ed of M	M int ance
A li bl	D e	Admini t tion	Inum Action	Do e	
Quab 1	1 amp 1	0 25 mg	0 25 0 5 mg (1 2 c) dil t d in 10 c	1/2 1 1/2 h	Not u d f
U S P B M	(1/240 gr)	(1/240 gr)	U i wly i v f i i w with an ther	dur tion	maintenanc
La id	an mp	8 (1 6 mg)	dra b l w	2 4 d	
U S P	0 4 and 0 8	(1/160)	6 (1 2 mg) i v	1 2	
C dil id	d 1/16		by 1 2 (0 2 0 4 mg) i v	d 11	
U S P (dist)	an amp	mg	3 4 h ur unfil if i cot in d	3 6 d	(0 2 0 4 mg)
ber	and 1/160	(1/200)	by 0 2 0 4 mg q 4 8 h = til f 2	d tion	(1/200 1/200 gr)
D g in	1 mp 1e	0 5 mg	1 mg, 1/2 (1 gr)	14 21 d	mg
U S P B P	(1/20 gr)	1 5 mg (3)	(1) (1/20 gr) in 2 (hour) th n 0 25	dur tion	(0 2 3 5)
(dist ber)		(1/40 gr)	mg (0 5) (1/240 gr) q 3 4 hou	3 6 day	(1/240 1/20 gr)
			until ffe t is btain d		
Digitalis	0 03 0 06 and 0 3	1 0 1 5 Gm	0 4 Gm (10 gr) i on 0 4 Gm (6 gr)	6 8 hou	0 05 0 2 Gm
U S P B P	t bl ts (1/2 1 and 1/2	(15 22 1/2 gr)	i 8 8 hou 0 2 Gm (3 gr) q 8 h	dur tion	(3/4 3 0 gr)
	Er)		f 2 3 d th 0 1 Gm (1 1/2 gr)	18 21 d y	
igit i	0 1 and 0 2	1 2 mg	b i d ti fr ct i cbi t d		
S P	(1/200 1/200 gr)	(1/50 gr)	0 4 mg (1/200 gr) i on and p e t in	6 8 hou	0 05 0 2 mg
			12 hou and th 0 2 mg (1/200 gr)	d ation	(1/200 1/200 gr)
g in	0 25	2 3 mg	b i d ti fr ct i bt i d	2 4 28 d	
S P B P	t bl ts (1/240 1/20 and	(1/20 1/20 gr)	1 mg (6 gr)		
	180		0 5 0 75 mg (1/120 1/200 gr) q 6 h	dur tion	mg
Lanato d C	0 3 mg tabi t	7 mg	r 1 3 m 1/20	2 6 d	(1/200 1/200 gr)
N P	(1/20 gr)		2 5 mg (0 5 gr) t		0 5 2 5 mg
(C dil id ²)			n th 0 5 mg q 8 h until		(1/20 1/20 gr)
	0 25 mg (240 gr) abt t only 1	11 bl ts U S	ff t i bt in d		

PARENTAL

schedule is maintained. If high blood levels are desired the individual dose must be increased so the interval between doses is shortened.

Because of the fact that 30-40% of the peak blood level of quinidin is still present in the serum 12 hours after following a single dose of quinidine a fixed dosage schedule such as 0.4 Gm (6 gr) every 2 hours for 5 doses can be repeated for several days to produce a certain concentration of quinidin in the blood.

U

Widely different opinions have been expressed by various radiologists on the indications, dosages and dangers of the use of quinidin. It must be remembered that patients in whom quinidin has been used have organic diseases predisposing to death occur even when quinidin is not given to the individual. Until recently no test of toxicity method of blood quinidin determination has been available the only method was often an arbitrary rather than a quantitative basis.

A Indications

- 1 Ventricular tachycardia
- 2 Conversion of atrial fibrillation to a normal rhythm. Most diologists feel that the presence of marked cardiac failure is a contraindication as digitalis is not effective.
- 3 Atrial fibrillation if digitalis fails to produce sinus rhythm.
- 4 Primary or secondary nodal tachycardia.
- 5 Prevention of reentry or premature rhythms.
- 6 Suppression of ectopic premature beats peculiarly following myocardial infarction. Complete treatment.

B Contraindications

- 1 Idiopathic syncope manifested by frequent premature beats or severe hypotension following the treatment of 0.1 Gm.
- 2 Complete heart block } R.L.T.
- 3 Bundle branch block } contraindicated
- 4 Thyrotoxicosis
- 5 Acute rheumatic fever
- 6 Severe bradycardia or conduction delay

Ratification

A Official (Quinidine Sulfate, U.S.P., B.P.) This is the official name of the material quinidine as per fully indicated (S. pag 203 for details).

B Preparation

- 1 It must be prepared in the form of capsules. The material is prepared in capsules and the material is not toxic. Quinidine Gluconate N.F. 0.8 Gm (12 gr) in 10 capsules.
- 2 10% Quinidine Sulfate U.S.P. in propyl glycol.
- 3 15% Quinidine hydrochloride dissolved in water and pyridine.
- 2 It is a suspension. An intravenous preparation should be used only when given by the quinidine and only by

and no dose will fit all patients. The patient should be instructed regarding the early toxic symptoms when they occur the drug should be stopped for one day and the patient then given the average maintenance dose.

- II Partially Treated Cases** If a digitalis preparation has been taken within 2 week give $\frac{1}{4}$ of the estimated digitalizing dose and then give additional digitalis cautiously observing patient's response.

III Intake Dosage and Methods

The oral route is preferred in maintaining digitalization. The exact maintenance dose must be determined clinically for each patient. (The table on page 199 gives the average doses.)

QUINIDINE

Quinidine is a valuable drug in the management of most cardiac arrhythmias. Quinine may be used but is only about 30% as effective as quinidine. Only quinidine will be discussed here.

Pharmacology

- A Action** Knowledge of the pharmacological effects of quinidine is important in order to understand the use of the drug. Quinidine has a variety of actions:

- 1 It increases the refractory period of cardiac muscle.
- 2 It slows the rate of atrial and ventricular conduction.
- 3 It decreases the excitability of the myocardium.
- 4 It reduces vagal tone.
- 5 It is a general depressant to smooth muscle.

As far as conversion of atrial fibrillation is concerned several of these pharmacologic actions oppose each other. The clinical effect depends on which of the effects predominate.

II Clinical Pharmacology

- 1 **Route** Can be administered orally I.M. or I.V. as occasion demands. The I.V. route should be used only by the experienced in the use of the drug and no agent still in use.
- 2 **Absorption** Orally quinidine is rapidly absorbed when a peak level in about 2 hours and is relatively slowly excreted. There is a slow release to about 30% of the peak level after 48 hours.
- 3 **Excretion and fate** Only about 20% of orally administered quinidine is excreted in the urine the remainder is metabolized in the body.
- 4 **Dose per day** After the same dose of the drug is continued for 5 or 6 doses at 2 hr intervals no significant rise in blood level occurs with further doses at the same interval.
- 5 **Cumulative effect** When a fixed dose of quinidine is given 4 times a day as in a maintenance schedule the blood level rises progressively but more slowly reaching a maximum in about 48 to 72 hours. The midday blood level then remains more or less the same as long as this method is

- If the patient has atrial fibrillation or atrial flutter, complete digitalization is advised to lower the ventricular rate and to improve ventricular function. If digitalis is not used, the decreased A-V conduction with quinidine may cause a sinus bradycardia rate of 30-50 beats per minute and may necessitate quinidine therapy.
- D. If cardiac failure is present in a patient with chronic hypertension who is immune to oral diuretics, additional measures (sodium restriction, mechanical diuretics, etc.) should be used prior to quinidine therapy. A period of complete ambulatory status following the treatment of cardiac failure is also advisable to decrease the likelihood of venous thrombosis. Anticoagulant may be desirable for a week prior to quinidine.
- A therapeutic method of quinidine administration is as follows:
 0.4 Gm (8 g) every 2 hours for 5-6 doses on the first day.
 This produces an average blood level of 6-7 mg/L. Each succeeding dose produces a progressively smaller increment in the blood level and, if convulsions do not occur after 5-6 doses, a high dose of the drug must be instituted. If the situation is urgent, this may be started after the fifth dose or one may wait until the next morning and start the dose with 0.8 Gm (8 g) every 2 hours. Giving the drug more frequently than every 2 hours does not permit the peak effect of the preceding dose to be reached. In most cases 0.8 Gm (8 g) every 2 hours for 5 doses will convert the arrhythmia to sinus rhythm. If not high doses can be used if no toxicity has been encountered and it is urgent to convert the rhythm. Eighty percent of the successful conversions occur with daily doses of 3 Gm (45 g) or less. If doses greater than this are used, successful conversion will be almost invariably associated with a significant quinidine effect. b. miquantified by
1. Progresses in blood quinidine level
 2. Determination of the fibrinolytic activity obtained by V_1 the right precordial lead with the dog's heart. The atrial rate slowed markedly: a) a fibrillation is the appearance of 200-250/min. conversions as a result
 3. Measurement of the QT interval and QRS complex. As these measurements increase up to 25-30% above the initial values, significant effects are not produced.

NITRITES

The nitrites act by relaxing the smooth muscle, especially of the coronary arteries and also of the other smaller blood vessels. A gas film in blood vessels. The rapid-acting nitrites are useful in angina pectoris, slowing the drug may benefit a few seconds as a hypotensive agent. Many are usually beneficial in patients with functional angina.

physician familiar with the use of the drug Quinidine Gluconate N F 0.8 Gm (12 gr) in 10 cc ampules can be diluted with 50-100 cc 5% glucose and given slowly I V at 1 cc per minute

Toxicity

A Idiosyncrasy See page 201

B Toxic Effect

- 1 The myocardial toxicity is the most important and should be specifically looked for when quinidine is used. The earliest effects are seen electrocardiographically
 - a Prolongation of the Q-T interval
 - b Prolongation of the QRS interval
 - c Ventricular premature beats or ventricular tachycardia
- 2 Nausea, vomiting and diarrhea. These are rarely critical but may be sufficiently severe to require cessation of the drug.
- 3 Cinchonism. Tinnitus, vertigo and headache are usually mild but may be important enough to require stopping the drug.

CAUTION: When the QRS interval becomes more than 50% wider than that seen before treatment or when runs of ventricular premature beats or ventricular tachycardia occur quinidine should be stopped immediately. In patients with atrial fibrillation who are converted with quinidine transient S-A block may occur at the time of conversion and nodal rhythm may be temporarily noted. This has not proved to be of clinical significance. In very rare instances ventricular tachycardia may progress to ventricular fibrillation and sudden death. Prolongation of the P-R interval is occasionally seen for a short time when sinus rhythm follows quinidine conversion of atrial fibrillation. This is rarely serious and usually subsides spontaneously as the smaller maintenance doses of quinidine are employed.

- 4 Other cardiovascular effects
 - a Hypotension may occur when large doses of quinidine are used or if the drug is given parenterally. It rarely is significant with ordinary oral dose.
 - b Embolic phenomenon. Embolism occurs in about 1% of patients with chronic atrial fibrillation converted with quinidine. The incidence is higher in untreated atrial fibrillation. In fact atrial fibrillation with frequent emboli is an important reason for attempting conversion to sinus rhythm. Anti-coagulants are advised for 1-2 weeks prior to conversion in these cases to prevent the development of new thrombi in the atria. The hazard of emboli with quinidine has been exaggerated but must be appreciated and regarded as a calculated risk.

Procedure for Conversion of an Arrhythmia to a Normal Rhythm

- A The patient should be under constant observation preferably in the hospital where frequent examination of apical cardiac rates and electrocardiograms may be taken.
- B A test dose of 0.1 Gm (1 1/2 gr) has been intravenously administered to exclude possible idiosyncrasies. Wait 2 hours.

usually if the patient on a low sodium diet indicates that it may cause or contribute to hypochloremic alkalosis (see page 187)

Parental Preparations

- 1 Mephyllyne Injection U S P (Mephyllyne[®]) 12 cc I V as needed
- 2 Mersalyl and Theophyllin Injection U S P Injection of Mersalyl B P (Salygan Theophyllin[®]) 12 cc I V as needed
- 3 Methylidyl Injection U S P (Methylidyl[®]) 1 I V or I M as needed
- 4 Methylmercuric Sodium U S P (Thimeric Sodium[®]) supplied as dry powder in vial 1.4 Gm (21 gr) in 10 cc vial 4.2 Gm (63 gr) in 30 cc vial Add distilled water to bring to proper volume as directed Give 0.5 to 2 cc as indicated Methylmercuric Sodium also used I M

Oral Preparation

Although the oral preparations are not fully evaluated and may be antineoplastic in the future they may still be warranted. See also the following available:

- 1 Methylidyl Injection U S P (Methylidyl[®]) with Ascorbic Acid U S P 12 tablets after very meal
- 2 Chloromethine N N D (Nohyd[®]) 18.3 mg (10 mg Hg) 1 tablet or more daily as needed

OTHER DIURETICS

- 1 Ammonium Chloride U S P B P 4.6 Gm (60.80 gr) daily for 3-4 days followed by a 1-week period of maintenance. Use full dose as a potentiating agent for the action of the diuretic.
Carbonic anhydrase inhibitor Acetazolamide N N D (Diamox[®]) 250-500 mg (4 1/2 g) daily 2 to 3 days weekly for titration of the diuretic effect.
3 Chlorothalidate (Diuril[®]) 250 mg (4 g) 3-4 times daily as a potent diuretic. The available data indicate that the drug appears to be a potent diuretic.

PROCAINAMIDE HYDROCHLORIDE U S P (PRONESTYL[®])

Procainamide is a potent antiarrhythmic agent. It is used in the treatment of supraventricular and ventricular arrhythmias. To a lesser degree it is used in the treatment of atrial fibrillation. It has been reported to be effective in the treatment of ventricular arrhythmias. Clinical experience is still too limited to state whether the procainamide quinidine is the drug of choice in the ventricular arrhythmias.

Nitrite Preparations

Preparations and Dose	How Administered	Speed of Action and Duration
Amyl Nitrite U S P B P Pearl contains 0.2 cc (3 η)	Break pearl in cloth inhale p r n	Onset 10 sec Lasts 5-10 min
Glyceryl Trinitrate Tablets U S P B P (Nitroglycerin) 0.305 mg ($\frac{1}{200}$ $\frac{1}{100}$ gr)	1 tablet placed under tongue p r n	Onset 1-2 min Lasts 15-40 min
Pentaerythritol Tetranitrate N N D (Peritrate [®]) 10 mg ($\frac{1}{4}$ gr) tablets	Orally every 4-6 hours before meals	Onset 15-30 min Lasts 4-6 hours
Sodium Nitrite U S P B P 30-60 mg ($\frac{1}{2}$ 1 gr)	Orally every 3-4 hours	Onset 5-10 min Lasts 1-2 hours
Erythrityl Tetranitrate Tablets N F 15-30-60 mg ($\frac{1}{4}$ $\frac{1}{2}$ 1 gr)	Orally every 4-6 hours	Onset 15-20 min Lasts 3 hours
Mannitol Hexanitrate Tablets N N D 15-60 mg ($\frac{1}{4}$ 1 gr)	Orally every 4-6 hours	Onset 15-30 min Lasts 4-6 hours

XANTHINES

Recent studies with cardiac catheterization and metabolic balance studies have demonstrated that at a dosage xanthines increase the cardiac output increase renal blood flow and glomerular filtration rate and enhance the excretion of sodium and water. They therefore may be valuable in the treatment of cardiac failure. In addition they have been shown to increase the coronary blood flow when used in large doses and may on occasion be helpful in angina pectoris.

Preparations

- A Oral A variety of official preparations are available but a satisfactory one is Aminophylline U S P B P (enteric coated) 0.107 Gm ($\frac{1}{2}$ 3 gr) 4-6 times per day.
- B Parenteral Aminophylline Injection U S P B P 0.2505 Gm ($\frac{3}{4}$ $\frac{1}{2}$ gr) 1 V slowly over a 5 minute period 0.1 M may repeat in 2-4 hours.
- C Rectal suppositories containing Aminophylline U S P B P 0.3605 Gm ($\frac{1}{2}$ 3 gr) may be valuable in an impending attack of cardiac asthma or in nocturnal angina pectoris.

MERCURIAL DIURETICS

The mercurial diuretics act by reducing the tubular reabsorption of sodium and chloride. They may be used for a wide range of most causes except those associated with impaired renal function. They are of great importance in congestive failure. A. O. D. ex. 1. c.

Chapter 8

DISEASES OF THE BLOOD VESSELS

PERIPHERAL ARTERIAL DISEASE

An important consideration in the management of patients with peripheral arterial disease is the determination of (1) the amount of disability due to spasm and (2) the amount of disability due to occlusion. Therapy is aimed in each case at relieving these disturbances.

Differential Diagnosis of Common Peripheral Vascular Diseases

	Rheumatic Disease (code N 47x 502)	Thromboangiitis Obliterans (code No 40 930)	Arteriosclerosis Obliterans (code No 460 952)
Sex	70-80% female	97% male	Over 75% male
Age at onset	10-50 years	20-35 years	Over 40 years
Etiomorphology involved	Usually upper but may occur lower	40% upper, 98% in lower	Always lower rarely upper
Symmetry	Symmetrical bilateral	Asymmetrical usually bilateral	Asymmetrical usually bilateral
Peripheral arterial pulsation	Present	Absent or diminished	Absent or diminished
Usual sites of gangrene	Small toes tips of fingers and toes	Variable	Variable
Vascular involvement (phlebitis)	Absent	Often present	Absent
Calcification in arteries	Absent	Rare	Usually present

Degrees of Spasm and Occlusion in Peripheral Vascular Diseases

Disease	Spasm	Occlusion
Arteriosclerosis obliterans	0 to +	+++
Thromboangiitis obliterans (Berg's disease)	++	++
Rheumatic disease	+++	0 to +
Autointoxication	+++	+++

Dosage and Administration

- A Oral Preparation (250 mg capsules) 0.25 to 1 Gm (4 to 15 gr) orally every 4 to 6 hours is the recommended dose.
- B Intramuscular Preparation (1 Gm ampules in 10 cc diluent) The peak effect occurs within 15 to 60 minutes and a significant blood level is still present after 6 hours. The blood level is higher and the decrease is slower in patients with congestive failure and renal insufficiency. Hypotension is infrequent with the intramuscular use of the drug in the above dosage.
- C Intravenous Preparation (1 Gm ampules in 10 cc diluent) Can be used for ventricular tachycardia of a severe or urgent nature. The drug should be given very slowly 50 to 100 mg (3/4 to 1 1/2 gr) per minute up to a dose of 1 Gm (15 gr) with continuous blood pressure and if possible electrocardiographic control.

Toxicity

The same precautionary methods outlined in the sections dealing with quinidine are essential when procainamide is being used.

- A Severe Hypotension This is noted particularly with the parenteral use of procainamide and may be severe enough to require cessation of the drug. This is why frequent blood pressure demonstrations are necessary while the drug is being given.
- B Conduction Defects Prolongation of the QRS interval may occur as with quinidine.
- C Ventricular arrhythmias may occur as with quinidine.

A General

- 1 Correlate any disorder (e.g. angiotensin) which may interfere with the blood supply
- 2 Discontinue if present in a severely out of control
- 3 The same in any form should probably be withheld but there is no complete agreement on this point except in thromboangiitis obliterans or Buerger's disease where treatment is usually in the patient with continuous smoking
- 4 Alcohol beverages in moderation are not contraindicated
- 5 A well-balanced nutritious diet should be maintained
- 6 Adequate rest and relaxation void fatigue

B Local Measures

- 1 Avoid extremes of heat and cold do not use contrast baths
- 2 Fingernails to a free fingertip controlled Fugicidal dressings to (e.g. Castles) may be used. Avoid using Whitfield's ointment (see page 89)
- 3 Infection of and is a must to the foot if extremity must be guarded against. The patient should be given the following instructions:
 a. Soak feet for 10-15 minutes in warm water (not hot water) before dressing
 b. Bunches of corns must be removed by physician or a chiropodist
 c. Skin must be kept fit and pliant by rubbing with lanolin or a bland vegetable oil 2 times daily
 d. Socks should be changed at least once a day. For warmth use soft woolen socks 2 pairs of another kind
 Shoes must be well fitted and have proper support

C Special Measures The following may be used in an attempt to increase circulation

- 1 Bleg exercise may be of value. However do not if an infected non-healing wound present. Individual therapy of hyperthermia Demonstration and results refer to report
 a. Elevate leg about 45 degrees (suppose the member inverted and held in the wall) until burning or pain occurs (usually 10-15 minutes or less)
 b. Next allow the leg to drop freely for 2-5 minutes until maximum relief is obtained. At the same time the feet are moved downward and upward and then downward and upward. The toes are spread apart and held while the movement is being made. Do this off and on for 10-15 minutes. If the foot is painful it may be necessary to limit the time.
 The patient is held in a horizontal position for 2 minutes
 c. Repeat the movement 5 times each session and has 3-5 sessions daily
- 2 Manual massage may be substituted. It is probable that the only effect is to increase the circulation
- 3 Vasodilator drugs (see page 211). The use of allyl is of little or no value and unless the disease is bacterial vasodilator on many occasions be harmful. Blood flow studies show a decrease in the blood supply to the ischemic limbs if the locally administered vasodilator is the height of systemic vasodilator used to drug

Differentiation of Spasm and Occlusion

	Spasm	Occlusion
Color	Livid cyanosis	Blanched
Moisture	Wet	Dry
Veins	Constricted	Full dilated
Temperature	Cold	Cold
Reaction to vasodilating tests	Extremity becomes warm	Extremity remains cold

Adequate differentiation can usually be made on the basis of the first 3 of the above factors. Peripheral arterial disease usually is a mixture of spasm and occlusion but in many cases one factor is more prominent than the other. Therapy is aimed at correcting the physiological abnormalities whenever possible.

Test for Degree of Arterial Occlusion

A simple technique for evaluating the degree of arterial occlusion in the lower extremities especially the foot is the reactive hyperemia and elevation test. The test is particularly useful in evaluating treatment and in determining the prognosis of the foot.

A. Technique

1. The patient is placed supine and the brachial blood pressure taken.
2. The toes are raised to 65 cm above the horizontal level and observed for blanching. (The arterial level is taken at 7 cm below the junction of the manubrium and the body of the sternum (angle of Louis)).
3. If no blanching occurs the feet remain elevated and blood pressure cuffs are inflated just above the ankles to a pressure 50 cm above brachial systolic pressure. The occlusion cuffs are left on for 5 minutes.
4. At the end of that time with the feet still elevated the pressure in the cuffs is suddenly released and the feet observed for return of color.
5. If at the end of 1 minute color has not returned the foot is lowered 5 cm and then lowered 5 cm every 30 seconds until color returns. The level at which color returns is noted.

B. Interpretation

1. If the filling pressure (level at which color returns) is 30 cm or more above the aortic spontaneous healing of an ulcer will occur or if amputation is necessary the heel of the foot the amputation site will heal.
2. If the filling pressure is under 35 cm the more extensive procedures (e.g. sympathectomy, endarterectomy) or drug therapy must be done to help raise the pressure.

CHRONIC OCCLUSIVE ARTERIAL DISEASE (Usually Arteriosclerosis)

Treatment

Primarily conservative but thromboendarterectomy, vascular grafts and sympathectomy are of inestimable value in the properly selected case.

Crite is for sympathetic B st determined on clinical
g o n d s assist d by vas d lator t st

(1) Clinical vid nce of incr a d vasomoto tone This
is viden d by sw ting cyanosis and const icted
veins (abs n of sev rubor and no mal o slow
blan hing r ction on levation)

(2) Symp th t block o ml test g x rel i f pain
and late mitt nt claudi ation and bett r color to feet

b C t aind tions

(1) M ked rub on d pendency

(2) Rap d blanching on el v tion

(3) At ophy of tissu

• Vasodilator drugs

a Chem l symp th ct my The int oduct of gangli c
bl king ag rt has affo d d a new pprosb to th el f
of abn rrm l va o n tri t Many h ve b n tri d but
only few are u ful

(1) Ad nergic blocking gents Th s drug ct ith
n v nding in th v acul r mu cl ell (eu o
ff tor te) whi h is prob bly the m st desirable
mod of action They thus n t only block the sympa
th tic v oconst fctio t muli b t also the v o o
tr cto eff is fr m circ lating epinephrine and nor
ep phrins Th g o p of drug in l des Tolaz li e
Hyd o hlor d L S P (P iscoline®) ph oxybe
m (D b yl e®) Az pt Ph sphate N N D
(l d ®) and Nyl d in Hydr hlo d N N D (Ar
ldin®) (t bl) Thes drug ar effect v o ally
They ar th mo t us f id g i unte act g ab
mal vaso p sm

S d effe ts wh h a t ble om b t o s r o
m y b a al g t m s p kly s ation of
calp Weak ss d zin s a d fat gu r lated
to a mode al po t r l hypot nsion this may be co
re ted by a d r in do age O rd age may e
s l i a m p f und po t r l hypot ns on with
faintn s r y pe The drugs ho ld be d
with aut on in y patie t who g v a history of
asthma o p pti ulce Th y may b g n t a
ve sly or t art ally (ra lv ary)

D g	How S plied	Do g
T laz lin HCl U J P (P s lin ®)	25 mg tabl t	St rt w th 1/2 tabl t t d p c and g d ally in e to 4 8 t blet d ly
Ph o yb min HCl N N D (Dib li ®)	10 mg ps les	Start w th 2 ap ul d ly p d a by l e try 4 day up to 4 6 ps le d ly
Az pc in Pho phat N N D (lild r®)	25 mg t bl ts	Sta t w th 1 t bl t t d p fo l w k 2 t bl t t d fo the 2 d w k th may in cas t a maximum of 2 tablet q i d
Nylidra HCl N N D (Arld ®)	6 mg tablet	S t w in 1 tabl t t d p and inc as grad ally to 1 tabl t 4 6 times d ly

D Treatment of the Severe Stages of Peripheral Arterial De-
compensation**1 Treatment of claudication**

- a Teach patient to walk slowly take short steps and to stop to rest before the pain of claudication is fully developed
- b Correct any ligamentous or arthritic disabilities stretching exercises salicylates

2 Treatment of rest pain

- a Have patient sleep with the head of his bed elevated 8-12 inches
- b Limit activities rigidly
- c If edema has developed, an oscillating bed or Buerger's exercises may be prescribed (see page 309)

3 Treatment of severe infection or incipient gangrene

- a Start antibiotics as soon as infection occurs (see page 516)
- b Keep extremity horizontal or lowered never elevated. The oscillating bed may be useful
- c Keep the foot free of dressings
- d Room temperature must be comfortable (70°-80° F)
- e Support bed clothes by use of a cradle over affected limb or by a pillow under bedclothes at the foot of the bed
- f Drain purulent pockets thoroughly but gently. This may be accomplished by covering crusted lesion with a few layers of Vaseline® or Xeroform®; use for 24 hours then applying saline sponges at room temperature and changing frequently during the next 48 hours. Then dress the lesion with a bacitracin or bacitracin-neomycin ointment and a single layer of Xeroform® gauze for 2-3 days. Reconstitute this treatment when necessary.

E Surgical Measures

- 1 Thromboendarterectomy is especially useful in the segmental or localized occlusion of major arteries
- 2 Sympathectomy if there is some evidence of abnormally increased vasomotor tone (see page 208)
- 3 Conservative amputation (toe or transmetatarsal) when a reactive hyperemia and elevation test shows a filling pressure in the small blood vessels of 35 cm or more (see page 98)
- 4 Classical supracondylar amputation if filling pressure in small blood vessels by reactive hyperemia test is less than 35 cm and thromboendarterectomy or sympathectomy is not indicated

VASCULAR SPASM**Treatment**

- A General Measures The same as for occlusive disease. However tobacco in any form must be strictly prohibited
- B Local Measures The same as for occlusive disease especially if associated occlusion is present
- C Measures aimed at prolonged or permanent relief of spasm
 - 1 Surgery Sympathectomy of the affected extremity is usually the treatment of choice

Crit is for sympathectomy Best determined on clinical grounds assisted by vasodilator tests

(1) Clinical evidence of increased vasomotor tone This is evidenced by sweating cyanosis and constricted veins (absence of ever rubor and normal or slow blanching reaction on elevation)

(2) Sympathetic block usually to give relief of pain and intermittent claudication and better color to feet

b. Contraindications

(1) Marked rubor on dependency

(2) Rapid blanching on elevation

(3) Atrophy of tissues

c. Vasodilator drugs

a. Chemical sympathectomy The introduction of ganglionic blocking agents has afforded a new approach to the relief of both intermittent claudication Many have been tried but only a few useful

(1) Adrenergic blocking agent These drugs act at the sympathetic innervation of the vascular muscle cells (in utero if correct) which is probably the most desirable mode of action They thus not only block the sympathetic vasoconstrictor stimulus but also the vasoconstrictor effects from circulating epinephrine and norepinephrine These group of drugs include Tolazoline Hydrochloride U.S.P. (Pronalgin®) phentolamine (Dibazyl®) Azapropyl Phosphate N.N.D. (Iliad®) and Nylid Hydrochloride N.N.D. (Arlidin®) (see table) These drugs are effective orally They are the most effective drug available for the treatment of

Sufferers who have trouble with the circulation may be also get more quickly a sensation of sleep Wake up as a result of fatigue associated to a moderate posture hypotension this may be corrected by a dose in dosage One dose may be 0.1 mg per 100 lb post hypotension with faintness or dizziness The drug should be used with caution a physician who gives a history of thromboprophylaxis They may be given it a enough to it a trial (usually 1-2 mg)

Drug	How supplied	Dosage
Tolazoline HCl U.S.P. (Pronalgin®)	25 mg tablets	Start with 1/2 tablet 4 times a day and gradually increase to 4 tablets daily
Phentolamine HCl N.N.D. (Dibazyl®)	10 mg capsules	Start with 2 capsules 4 times a day and increase by 1 capsule 4 times a day up to 6 capsules daily
Azapropyl Phosphate N.N.D. (Iliad®)	25 mg tablets	Start with 1 tablet 4 times a day for the first 2 tablets then increase to a maximum of 2 tablets 4 times a day
Nylid HCl N.N.D. (Arlidin®)	6 mg tablets	Start with 1 tablet 4 times a day and increase gradually to 1 tablet 4 to 6 times daily

- (2) *Veratrum viride* compounds : Produce peripheral vasodilatation by depressing vasomotor centers in the hind brain. They do not block vasoconstricting effects from circulating epinephrine and norepinephrine. They are relatively ineffective in a patient with vascular spasm.
- (3) Tetraethylammonium ion and methonium compounds : Block sympathetic and parasympathetic impulses at ganglionic synapse. They do not block vasoconstricting effects from epinephrine and norepinephrine and may potentiate vasoconstricting responses to epinephrine and norepinephrine.
- b. Direct vasodilators (act directly on vascular muscle)
Nitrites, nicotinic acid and derivatives have not proved too successful in patients with abnormal vasoconstriction.

ACUTE ARTERIAL OCCLUSION

(Acute Arterial Embolism code No 46 618)

Acute arterial occlusion is usually due to embolism. It occurs most commonly in patients with a aortic fibrillation or myocardial infarction but may result from thrombosis of a vessel especially during periods of hypotension.

The onset is frequently sudden and associated with severe pain. Constitutional symptoms and shock are present if the artery is of large caliber. There is pulselessness of the distal artery and pallor and coldness of the extremity with numbness, tingling and muscle paresthesias. If treatment is not instituted the extremity or part may undergo gangrenous change.

Treatment

- A. Surgical : Immediate embolectomy is the treatment of choice.
- B. General Measures : To combat the thrombotic extension of the embolus and reflex vasoconstriction institute the following measures at once and continue postoperatively (if surgical treatment is not possible).
1. Morphine sulfate 10-15 mg ($\frac{1}{2}$ to 1 gr) I.V. 4 times and repeat as needed subcutaneously.
 2. Anticoagulant therapy should be instituted at once to prevent thrombotic extension of the embolus. Give Heparin Sodium U.S.P. B.P. 2 cc (20 mg) (2000 unit) I.V. immediately. The effects of this heparin will usually have worn off by the time the patient has been transported to a hospital or prepared for operative treatment. The usual regimen of anticoagulant therapy is then started as soon as possible (see page 215).
 3. Procaine or xylocaine block of the sympathetic nerves to the affected extremity may be helpful. Repeat as necessary but use cautiously in the patient who has received anticoagulant therapy.
 4. Vasodilator and sedatives
 - a. Papaverine Hydrochloride U.S.P. B.P. 30-60 mg ($\frac{1}{2}$ to 1 gr) I.V. every 2-3 hours.
 - b. Ethyl alcohol (as alcoholic beverage) orally in generous amount.

Ad energetic blocking agent (See page 211)

5 O dilating bed Useful in acute occlusions

C Local Measures

1 Keep extremity horizontal or slightly depressed if an occluding bed is not available protect against pressure or trauma

2 Avoid use of heat or cold to the affected part

D Treatment of Ischemic Neuritis May follow a useful routine

1 Cyanocobalamin U.S.P. (vitamin B₁₂) 1000 mcg hypodermically daily for 2 weeks has been advocated

2 Arteriotomy will give relief if Vitamin B₁₂ therapy does not help but restoration of circulation by thromboendarterectomy is preferred

DISEASES OF THE AORTA

AORTIC ANEURYSM

(Syphilitic code No 461 147 6)

(Arteriosclerotic code No 461 943 6)

Aortic aneurysm is a pulsating swelling which forms as the result of dilatation of the wall of an artery. The most important of the complications are aneurysms of the aorta. These are the most common of the arterial diseases.

The signs and symptoms vary with the location and size of the aneurysm. Most frequently they are due to local pressure and frequently to rupture. The most common symptom is pain which results from pressure on surrounding structures. Pressure on the thoracic aorta causes chest pain and dyspnea and on the abdominal aorta causes abdominal pain. Some aneurysms may be symptomatic and may be discovered by physical examination or by x-ray of chest or abdomen.

Treatment

A Spinal Manipulation Treatment of lying syphilis if present (see page 440)

B Surgical

1 Replaced the weak and dilated wall by an autogenous vein or by a synthetic graft. The graft is usually of the type known as Vinyon® or Gortex®.

2 Palliative Attempts to limit further dilatation by producing an internal thrombus along the wall of the aneurysm by external ligation of the artery or by other means. This procedure is to be used only in the presence of a high risk of rupture.

DISSECTING ANEURYSM OF AORTA (code No 461 940 1)

Dissecting aneurysm is caused by the rupture of the intima and the formation of a false lumen in the presence of hypertension. It usually occurs in the thoracic aorta and is often associated with atherosclerosis.

It is manifested by a sudden onset of severe agonizing pain usually in or near the site of the rupture. The pain may radiate to the head, back, pelvis or legs. Shock follows rapidly and death usually occurs in a few hours or days. Diagnosis is usually made at autopsy because of the clinical similarity to myocardial infarction and acute arterial occlusion.

Treatment

Treatment is entirely symptomatic and similar to that of myocardial infarction (see page 185). Surgery has been used successfully in a few cases.

DISEASES OF THE VEINS

VENOUS THROMBOSIS (code No 48 619) THROMBOPHELEBITIS (code No 48 100 V)

A condition of uncertain etiology in which a thrombus forms in a small vein (usually the lower part of the leg) and grows by deposition of fibrin and cells filling the larger veins of the leg (98% of cases). Inflammation of a localized area or much of the vein may be present. Early in the disease the chief danger lies in the detachment of all or part of the thrombus producing pulmonary infarction. Years later the chief danger lies in the development of the postphlebitic leg with edema, subcutaneous fibrosis and ulceration.

This condition is common in both medical and surgical patients. The present medical and surgical treatment methods are only of value but have no hope of being cured.

Diagnosis

Early diagnosis and immediate therapy are of importance to prevent pulmonary infarction.

A History Venous thrombosis tends to occur following abdominal or pelvic surgery, trauma, prolonged bed rest and in malignancy. Pain in calf and behind knee is important early symptom.

2 Pleuritic pain, sudden onset with bloody sputum is highly suggestive of pulmonary infarction.

B Physical Examination May be negative.

1 Examination

a Differs in color of feet with levitation.

b Slight difference in temperature.

c Distention of superficial veins of leg.

2 Pain or tenderness on palpation of mass in venous channel of calf or foot. Do not palpate too vigorously.

3 Homans' sign. Elevation of foot 90° does not elicit pain of foot.

4 Swelling of the calf. Usually late sign. May be detected only by measurement and comparison with the opposite limb or by repeated measurement.

5 Examination of the chest in case of suspected pulmonary infarction may reveal an area of diminished breath sounds and crackles or pleural friction rub.

Thrombolysis

A. Anticoagulant Therapy As soon as the diagnosis of venous thrombosis is made, anticoagulant therapy must be started at once. Prothrombin level and Lee-White clotting time must be determined first.

1. Heparin: Prolonged anticoagulant action of heparin may be obtained by the subcutaneous injection of a highly concentrated solution of sodium heparin into a relatively compact and avascular area of the subcutaneous fat. One injection daily appears to give a prolonged anticoagulant action. A highly concentrated aqueous heparin (200 mg per ml) is injected slowly through a No. 25 needle into the subcutaneous fat 1-2 inches below the posterior iliac crest. Average doses are as follows:

100 lb patient	200 mg daily
150 lb patient	250 mg daily
175-200 lb patient	250-300 mg daily

Check Lee-White clotting time before starting treatment and just before the next dose. If the clotting time exceeds 18 min, defer the next dose until it falls below this level. Modify dosage as necessary.

At present the most popular use of heparin is during the first stage of treatment from the first to the third days of anticoagulant therapy until the prothrombin depressant becomes effective. The subcutaneous administration of heparin may be used alone with or without addition of prothrombin depressants.

2. Prothrombin depressants: During the first stage of treatment (1-3 days) it is best to supplement the drug with heparin until prothrombin concentration reaches therapeutic levels (10-30%). Prothrombin levels should be determined daily and the next dose not given until the day level is known.
 - a. **Bishydroxycoumarin (USP) (D-umarol®)**: Usually takes 48-72 hours to reach effective therapeutic level and then some time to return to normal after discontinuing treatment. Initial dose is 200-300 mg on the first day, 100-200 mg on the second day. Maintain and decrease gradually from 25 to 150 mg daily.
 - b. **Ethyl Biscoumatate (NND) (Tromban®)**: Tissue anesthetic is said to induce a more rapid fall in prothrombin concentration and a more rapid recovery after cessation of administration than Dicumarol®. Initial dose is 1500-1800 mg in 2 divided doses on the first day and 300-600 mg on the second day. Maintain and decrease to 300-600 mg daily in divided doses. Heparin is usually only given if the first 24 hours because of the more rapid action of Tromban®.
 - c. **Phenindione (NND) (Hedulin®) (Dalion®)**: Has the advantage of producing a delayed action on the coagulation mechanism with tissue anesthetic. Initial dose 200-400 mg in 2 divided doses. Maintain and decrease to 25-150 mg in divided doses. Vitamin K is apparently not effective in counteracting the effect of phenindione but this may be of importance in view of the aptitude to form prothrombin levels after withdrawal of the drug.
 - d. **Warfarin (Sodium NND) (Coumadin®)**: A bishydroxycoumarin derivative which may be used orally or parenterally. The dosage is the same irrespective of the route of

administration The initial dose is 75 mg orally I V or I M The maintenance dose is 5-10 mg daily Induction of prothrombin depression is rapid but its return to normal may be prolonged up to 6 days

- 3 Duration of therapy varies with each case For most patients this is about 10-14 days. As soon as the therapy for about 7 days after there is no further fever or pain
- 4 Treatment of bleeding and over dosage The principal danger from anticoagulant therapy is abnormal bleeding
 - a Bleeding due to excess heparin Discontinuing the therapy will usually terminate bleeding in about 1-3 hours only if I V heparin has been used Immediate cessation is necessary slow I V injection of protamine sulfate 40-50 mg will neutralize the effect of 50 mg of heparin
 - b Bleeding due to excess prothrombin depression is more difficult to control for the prothrombin level rises slowly after therapy is discontinued The rise is more rapid when Tromexan® or phenindione has been employed
- (1) Severe bleeding
 - (a) Stop the drug and do not use again
 - (b) Fresh blood (citrate) transfusion immediately
 - (c) Phytonadione U S P (Mephyton®) 50-200 mg I V slowly (at rate not over 10 mg/min) by syringe or added to venous clots of dextrose and/or saline and repeat every 6 hours if necessary The action is more rapid than synthetic vitamin K like product (as menadiol is slow)
 - (d) Mephadrone Sodium Bitartrate U S P Gr 50-100 mg I V Stat and repeat 2-3 times in the 1st day
- (2) Mild bleeding (mild nose bleed hematuria urinary clotting)
 - (a) Stop drug rest at low dosage for prothrombin time rise to 20-30"
 - (b) Phytonadione U S P (Mephyton®) (5 mg/ml) 5-30 mg usually daily if bleeding is not controlled or become more severe I V is better
- c Overdosage of depression with bleeding if the prothrombin level drops below 10% add 2-5 mg daily after reduction in dosage give Phytonadione U S P (Mephyton®) 5-30 mg orally When prothrombin sees the drug may be given again

B Venous Ligature

- 1 Ligature of the femoral artery is contraindicated Venous ligation is recommended for a variety of conditions in which the anticoagulant therapy is contraindicated. This is seen especially with pulmonary embolism, pre-eclampsia, and in cases of renal or hepatic disease and in cases of peripheral vascular disease
- 2 Active thrombosis or embolism form the venous system to the lungs

C Garter Stocking or Elastic Bandage is applied snugly from foot to above knee or mid thigh to keep venous outflow of blood from the lower extremities. Check pulses. Rewrap every 6 hours

- 1 Exercise As soon as treatment is started allow for some movement and exercise in bed (see below). If leg is immobilized by taping and relaxing muscles in rest.
- 2 Ambulation As soon as the acute pain subsides (or if no pain is present as soon as therapy is instituted) the patient must be made ambulatory (unless other systemic conditions prevent this). During this time an elastic bandage should be worn. The time out of bed and walking is increased very slowly. The elastic bandage should be worn for about 3 weeks after full ambulation has been achieved.

Prophylaxis

A Early Ambulation and Exercise

- 1 Early ambulation Prolonged bed rest or inactivity should be avoided especially in elderly patients. Have patient up and about as soon as possible after operation or a venous ligation. Walking at first may be sufficient to sitting for half an hour or more in a chair.
- 2 Bed exercises If bed rest is necessary passive or active bed exercises should be initiated as soon as possible and should be continued as long as patient must remain in bed. The contraction of the calf muscles flexes the foot at the ankle and hip repeated 5-10 times an hour while awake.
- 3 Movement in bed With patients at bed rest keep bedclothes loose and patient moving as far as possible.
- 4 Elevation and massage Elevation of the foot of the bed at 6 inches and wrapping legs from the toe to just below the knees with a bandage will usually promote venous return.

B Routine Prophylactic Use of Anticoagulants in elderly patients who cannot be mobilized The above regimen should be of value (see also the chapter on p. 215) but in general the routine prophylactic use of anticoagulants is not advised.

POSTPHLEBOTIC EDEMA AND ULCERATION

Almost all patients with acute thrombophlebitis of a lower extremity develop the postphlebotic syndrome eventually. In developing the syndrome a predisposing disability, the haemostatic status of the patient and a follow-up (1) re-examination of the deep veins of the lower extremity with incompetent deep valves and edema or superficial varices or more frequently both (2) subcutaneous inflammation to the thigh (usually at the medial aspect of the lower third of the thigh) with the usual subcutaneous fibrosis, atrophy, pigmentation, edema of the overlying skin and (3) ulceration.

Diagnosis

A History The patient may not be a history of thrombophlebitis but there is almost always a history of major surgery for one of the lower extremities or prolonged bed rest for medical reasons.

B Symptoms and Signs

- 1 Edema and changes of the leg after prolonged standing going sitting is a frequent symptom. Limbs are relieved if observed by elevation of the extremity or by walking. Congestion and yaws of the skin may be present.
- 2 Increased pigmentation of the peripheral areas.

- 3 Episodes of inflammation of the medial aspect of the lower third of the leg
- 4 Dry scaling eczema of the lower medial part of the leg
- 5 Varices of the superficial saphenous system and incompetence of the deep valves usually can be demonstrated
- 6 Brownish red pigmentation of the skin just above the medial malleolus or less often just below the lateral malleolus
- 7 Subcutaneous fibrosis with retraction and shrinking of tissues may be very painful and disabling. Fibrosis is usually just above the medial malleolus but may girdle the leg
- 8 Ulceration in areas of subcutaneous fibrosis

Treatment

The accumulation of protein rich edema fluid is the main cause of the more serious manifestations of the postphlebotic syndrome. If edema is conscientiously avoided these may be prevented.

A Control Edema

- 1 Sleep every night with foot of bed on 4 inch blocks
- 2 Wear well fitted (made to order = NOT stock supply) heavy duty elastic stocking below the knee with fitted heel
- 3 Three to four 20 minute rest periods during the day with feet elevated 6 to 8 inches above heart level

B Control Infection Control of dermatophytosis and any honey comb is essential. Castellani's dye to toes and nails once or twice a week is probably the best control measure.

C Exemol Ulceration Once these signs appear elastic support is not adequate. A carefully fitted semi rigid boot of the Unna's paste boot type will heal most ulcers in 2-4 months. Boots may be applied with tape and sheet cotton Vaseline[®] or GauTex[®]. The patient continues his usual activities. The boots should be applied with firm even pressure so that the leg without irregularities which may cause further damage to the skin. They must be changed every 1 to 2 weeks depending on drainage but once the ulcer is healed or drainage is minimal it can be left on as long as 4 to 6 weeks.

Viscopaste[®] bandage is a Unna's paste type bandage 3 1/2 inches wide impregnated with gelatin and zinc oxide. The GauTex[®] bandage is a 3 inch bandage impregnated with a self adhering compound which is surprisingly non allergic.

The bandage should extend 2 inches from the base of the toes include the heel and continue to a point immediately below the bend of the knee. A thin layer of cotton sheeting or gauze is used to pad the Achilles tendon and the dorsum of the foot. An extra layer of cotton or gauze and a melinex or bhr sponge 1/4 inch thick is placed over the ulcer. Special attention especially antibiotic preparations are not necessary. The bandage is started with one horizontal turn around the foot and when completed it is carried obliquely over the heel and then back around the foot. After the heel has been adequately covered the bandage is carried up the leg. No attempt should be made to apply it as a continuous spiral. It should be allowed to follow its own course without pleating and should be cut frequently if necessary so that bandaging may be recommenced to build up a uniform thickness of paste or bandage which should be molded carefully to conform evenly to the shape of the limb.

Chapter 9

DISEASES OF THE BLOOD AND LYMPHATIC SYSTEMS

ANEMIAS

HYPOCHROMIC ANEMIA (code No 501.736) (Normocytic and Microcytic)

Hypochromic anemia (low color index and MCH of less than 27 $\gamma\gamma$) include anemias due to nutritional deficiencies, infections and to iron and chronic blood loss. Women require about 4 times as much iron as men up to the menopause.

Pathogenesis

A Chronic blood loss

B Inadequate intake of iron (nutritional anemia)

C Defective absorption of iron in the gastrointestinal tract (e.g. hypochromic anemia of infection) due to a influencing absorption of iron in the following

1 Acorbic acid deficiency inhibits the absorption of iron hydrochloride and does not

2 Depletion of body iron increases the absorption of iron

3 Valence of iron ingested (Fe^{++} is easily absorbed Fe^{+++} is not)

4 Infection causes decreased absorption of iron

5 Potassium deficiency also decreases the absorption of iron

D Idiopathic mechanism

E Pregnancy

Treatment

A Specific measure

1 Correct life style, using or controlling agents anemia, e.g. hemorrhage, infection, diabetes, vomiting, intestinal polyps, and tumors

2 Iron is specific for this type of anemia. It is best given immediately after meals

a Oral preparation and dosage (Physiological need is 15 mg/day maximum absorption is considered to be about 100 mg/day)

(1) Ferrous Sulfate U.S.P. B.P. 0.2 to 0.3 Gm (3.5 gr) t.i.d.

(2) Ferrous Sulfate Syrup U.S.P. 0.12 Gm 2 gr (peppermint) 4.8 cc (1.2 dr) b.i.d. or t.i.d. p.c.

SIZE COLOR RELATIONSHIPS OF RED BLOOD CELLS IN THE VARIOUS ANEMIAS

SIZE	COLOR		
	HYPOCHROMIC MCH < 21 γγ CI < 0.9	NORMOCHROMIC MCH 27-32 γγ CI 0.9-1.1	HYPERCHROMIC MCH > 30 γγ CI > 1.1
MICROCYTIC MCV < 100 μ VI < 0.9	Anemias due to faulty iron absorption of iron Iron deficiency anemias Anemias due to infections Anemias due to chemical and physical factors Splenomegaly Erythroblastopenia	Uncommon	Uncommon
NORMOCYTIC MCV 80-94 μ VI 0.9-1.1	Anemias due to blood loss Hemolytic anemias Erythroblastic anemias Myelophthisic anemias	As for hypochromic microcytic and normocytic anemias Aplastic anemias	Uncommon
MACROCYTIC MCV > 95 μ VI > 1.1	Macrocytic anemias complicated by iron deficiency or blood loss or other of the above factors	As for hyperchromic macrocytic anemias	Pernicious anemia Tropical anemias Anemia of pregnancy Fish tapeworm anemia Macrocytic anemias associated with idiopathic atrophic gastritis Chronic liver disease Metastatic carcinoma (rare) Faulty laboratory technique Pseudoanemia Infection

- (3) Ferrous Carbonate Pills NF Pils of Iron Car
bonate B P 0 5 1 0 Gm (7 1/2 15 g) t i d p
(4) Ferrous ammonium sulfate solut n (50%) 4 c (i d)
t i d p
(5) Ferrous Gluconate USP 0 3 Gm (5 g) t i d p
b Paracetamol i d also until r e to oral iron
sufficient to relieve pain (p hysiotherapy) g str in
t h i d i s a p e l d n g use of a l i n p l e m e t
of depleted d i n s t o a w h e n l i n f a l a d e i
tivity to o s t m The following forms of paracetamol
m hold b g e n o l y : a m t o n e a y t o r c t
t h d e f e c y C l i t t h i s m o t b y t h e f o l l o w i n g 2 5 m
f o r m u l a 0 5 5 w e i g h t (l b s) x (c m l H g h % - p a t i e n t
H g h %) m g o f m e t a l l i c o n (t o t a l d o s e) n e e d e d f o r 1
(1) S a h t d o n o x d e f I V u C n t n 2 %
m e t l b c i o n (0 m g p e r c c) G 5 0 m g (3/4 g) t w o
S t a d t h e 1 0 0 1 5 0 m g (1 1/2 1/2 g) I V d i l y f i
u t i l t h t a l d o s e h a s b e e n
(2) I r o D e x t a n C m p l N N D (I m f o e) f o 1 M
s C t o n 5 " n t a l l i r n (5 0 m g p c) G e
5 0 m g (3/4 g r) S t a d t h e n 1 0 0 1 5 0 m g I M d i l y
o r v e y o t h d a y u t i l t h e t o t a l d o s e h a s b e e n
l i f e i d p l y w t h a 2 i n h n d i l t o t h p p r o u t r
q u a d r a t o f t h e b t i o k u s t h e Z i t c h i c (p u l l i n g
k i o n s a d e b f o i n s i g n d i e) t p r v n t
l a k g o f t h e o l i n e d d o l o r a t i o n o f t h e k i n
A d j u n t t h e r p y
a A s a b e A c d U S P G e a n g j c o r
o r b c d i b l e t 3 0 m m m g p e r d y t o c h i l d e n
1 0 0 1 5 0 m g p e r d y t a d l t
b D i l u t d H y d r h l A c d N F (1 0 %) 2 4 (1/2 1
d r j t i d i n g l s s o f w t e r w t h m e l s e p p d t h r o g h
a g l s f b e t u b e f r q u n t l y h a s b e e p e s i b d f o r
p a t i e n t s w t h c h l h y d r a b u t r c e t v i n n d u t s
t h t d l t h y d c h l o a c d d o n o t f e l t t t h a d
m p t i o n o f w t h g t r o n t e s t a l t a t I f p e c i e d
p a t i e n t m u t b u h t i n w t h a d u n b r o n a t a f t e r
m l a t i n o t a l c d l e f t o n t h e t a t e t h

B G L M #

1. High low high protein high on high vitamin
diet At least 70 Gm protein/day for average adult Food
high in on include liver other organ meats fresh d
meat yet a egg vegetable especially vegetable g
protein of protein At 240 low diet contain
ing 70 Gm protein 115 Gm fat and 230 Gm carbohydrate
while in protein initially 20 mg of iron
2. Vitamin Vitamin deficiency is usually multiple and a
associated with the nutritional deficiencies Make a
full survey into the status before diagnosing exp
the vitamin problem at which are indicated
identified the Vitamin deficiency definitely and definitely
is more than one but both polling accuracy
a hypoproteinemia most vitamin deficiency
Deficiency cases a most often multiple so that is
ly divisible to administer the vitamin proportion to is
Specific protein to is only fructose vitamin

deficiency (see page 39)

- 3 Whole blood transfusions preferably of fresh blood are used when there is need for rapid restoration of hemoglobin. This need is more urgent when hemoglobin is less than 8 Gm per 100 cc (50%) (see page 247)
 - a Acute hemorrhage when blood loss is greater than 500 cc
 - E Chronic hypochromic anemia when
 - (1) Need for correction of anemia is urgent (e.g. surgery and acute splenitis)
 - (2) Failure to respond to anti-anemic measures. Re-evaluate and consider other causes for the anemia (e.g. blood dyscrasias and serious constitutional diseases)
- 4 Red cell mass (sludge) transfusions are used to restore hemoglobin and red cells without increasing plasma volume and perhaps reducing risk of serum reactions
- 5 Thyroid May be indicated if anemia is associated with frank hypothyroidism or myxedema (see page 368)

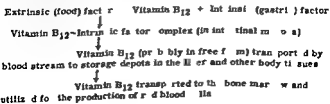
MACROCYTIC ANEMIAS

PERNICIOUS ANEMIA (code No 501.702)

Pernicious anemia (P.A.) is a chronic and if untreated progressive macrocytic anemia. The primary defect is the failure of the gastric mucosa to produce a substance (intrinsic or gastric factor) that is essential for the absorption of the vitamin B₁₂ in certain foods.

In the absence of intrinsic factor, inadequate absorption of vitamin B₁₂ occurs and a deficiency of this vitamin develops. Vitamin B₁₂ is essential for normal erythropoiesis. When deficient, pathologic red blood cell formation (megaloblastic regeneration) occurs. There is no primary deficiency of folic acid in P.A. The disease responds specifically to the parenteral administration of vitamin B₁₂ or of extracts of liver containing vitamin B₁₂ or to the oral administration of live or freeze-dried preparations containing intrinsic factor and vitamin B₁₂.

The relationship of dietary and gastric factors to normal B₁₂ formation (modification of Castle's theory) may be outlined as follows:



Diagnosis

A Symptoms

- 1 Anemia Weakness, dyspnea and palpitation
- 2 Gastrointestinal Anorexia, diarrhea and dyspepsia
- 3 CNS Numbness and tingling of extremities and sphincter incontinence

B Signs Pallor, icteric tint, tachycardia, glossitis, mild hepatomegaly and plasmogly diminution of vibratory sense and ataxia

C Laboratory

- 1 Hematamine achlorhydria
- 2 Macrocytic anemia
 - a MCV 95-160 μ
 - b MCHC > 36% (normal)
 - c MCH 33-38 $\gamma\gamma$ (normal)
 - d Orthochromatic megakaryoblasts (normoblasts) presentAnisocytosis, poikilocytosis and polychromatophilia
- 3 Bone marrow changes
 - a Reticular white in red and soft
 - b Large numbers of megakaryoblasts are present

II The response to Vitamin B₁₂ Extract of Liver and Liver Substitutes

- 1 Disappearance of symptoms and signs
- 2 Reticulocyte response (normal count is less than 1%)
- 3 Improvement of anemia Occurs about 1 week after beginning adequate parenteral or oral administration of vitamin B₁₂ therapy

Treatment

Treatment should be based upon an accurate diagnosis. Different minimum doses under conditions characterized by macrocytic anemia.

A Specific Measures Parenteral therapy is at once recommended although oral preparation is available (see below) for those patients who cannot or will not accept parenteral treatment. Neither crude extract nor folate derivatives should be administered to P.A. patients.

The parenteral administration of the extract of liver or of vitamin B₁₂ uniformly followed by optimal clinical and hematological responses. Following such therapy the P.A. patient in relapse will undergo an increase in circulating reticulocytes (eaching a peak in 6-10 days) and a return of erythrocyte and hemoglobin values to normal in 3-5 weeks.

1 Parenteral dosage and indications

a Full complement of P.A. in relapse

- (1) Initial intramuscular injection 20-30 mg of crystalline vitamin B₁₂ (Cyanocobalamin U.S.P.) vitamin B₁₂ mesylate or folic acid (5 mg daily) liver extract (Live Injection U.S.P.) Liver injection contains 10-20 micrograms of vitamin B₁₂ per cc. Give the equivalent of 20-30 microgram of vitamin B₁₂. Vitamin B₁₂ contraindications may cause allergic reactions.
- (2) Subsequent injections

(1) Parenteral in relapse Give 10-20 micrograms vitamin B₁₂ or equivalent every third or fourth day.

until blood values return to normal

(b) Mild relapse 15-20 micrograms weekly usually is adequate

- E For P A complicated by degeneration of the spinal cord Doses in excess of the amounts needed for uncomplicated P A may be required. The degree of reversibility of neurologic manifestations is inversely proportional to the duration of symptoms. Improvement frequently is marked in patients with symptoms of 6 months' duration or less, less pronounced in patients with symptoms of 6-12 months' duration, and negligible in patients with symptoms of more than 1 year's duration. It is advisable to treat all patients intensively for at least 6 months and preferably for 1-2 years.

Physical therapy including coordination exercises is an important adjunct to the specific therapy of P A complicated by spinal cord degeneration.

(1) Initial IM injection 30-60 micrograms of vitamin B₁₂ or refined liver extract

(2) Subsequent injections 20-30 micrograms 2 or 3 times weekly for 6 months or more or until optimal neurologic improvement has been demonstrated. If optimal neurologic improvement has not occurred at the end of 6 months continue with 20-30 micrograms once a week.

- c Maintenance therapy. The nutritional requirement for vitamin B₁₂ in normal individuals is 1-2 micrograms or slightly less each day. This amount administered to patients with P A in whom blood values have been returned to normal and optimal neurologic recovery has been observed will provide satisfactory control in most instances. 15 micrograms of vitamin B₁₂ or refined liver extract IM once every 2 weeks should be considered a safe dose and may be necessary during periods of increased stress (infection, prolonged debility, or chronic illness).

The patient must be instructed as to the need for adequate and regular supply for the remainder of his life. The serious risks of neglect should be emphasized.

Oral preparations. The response to the oral administration of powdered high-potency liver extract preparations and tablets of vitamin B₁₂ (even in high dosage) usually is slower, less uniform, and often suboptimal when compared with the response to parenteral therapy. It is possible that the rapid administration of intramuscular or intravenous vitamin B₁₂ compounds or the inhalation of powdered vitamin B₁₂ following intranasal dosing will prove to be satisfactory methods of treatment, but the reliability of these methods has not been proved as yet.

- a Powdered Stomach U S P (Ventriculi [®])
- b Liver With Stomach U S P (Ext [®])
- Tablets of vitamin B₁₂
- d Powdered vitamin B₁₂
- e Combination vitamin B₁₂ With Intralipid P C C N
cebrate U S P (divided from various sources)

■ General Measures Periodic clinical and blood examinations should provide the basis for administration and dosage of liver iron and adjuvant drugs

- 1 Rest Patients with profound anemia should be at bed rest Hospital care may be necessary for patients with neural involvement (ataxia and sphincter disturbances)
- 2 Diet A diet adequate in calories minerals and vitamins does not need to be supplemented with extra quantities of dietary liver unless for some reason the patient is not receiving parenteral liver therapy
- 3 Iron Ferrous salts may be given as an adjuvant to liver therapy when the iron content of the red cells is low ($\text{MCHC} < 32\%$ or low color index) Elderly patients usually require more iron (see page 219)
- 4 Diluted Hydrochloric Acid HCl (10%) 24 cc (½ 1 dr) tid in a glass of water taken through a glass straw with meals may be given to patients who have diarrhea as a complication of the achlorhydria Patients must brush teeth with sodium bicarbonate mouth daily after meals to neutralize hydrochloric acid and prevent erosion of teeth
- 5 Thyroid may be used in patients who fail to respond due to associated hypothyroidism
- 6 Measures to improve liver function in P.A. patients with associated hepatic damage have been suggested in an attempt to aid synthesis and storage of the extrinsic factor (see page 280)

MACROCYTIC ANEMIA OF PREGNANCY (code No 501.701) (Pernicious Anemia of Pregnancy)

A hyperchromic macrocytic anemia characterized by megalo blastosis in the bone marrow usually occurring at end of the second or during the third trimester of pregnancy

Treatment

This anemia responds specifically to the oral or parenteral administration of folic acid or to crude liver extract (which contains folic acid) It does not respond to the parenteral administration of vitamin B₁₂ or refined liver extract (which contains virtually no folic acid)

A Specific Measure After delivery treatment with folic acid (or crude liver extract) may be discontinued since relapse does not occur

- 1 Folic Acid U.S.P. 10-15 mg (¼ ½ gr) orally daily
- 2 Liver Injection Code U.S.P. 4 cc (1 dr) IM daily
- 3 Vitamin B₁₂ and refined liver extracts are of no value

■ General Measures

- 1 Give in recommended units of animal protein even if diet is already adequate beginning early and continue throughout pregnancy
- 2 If hypochromia occurs ferrous salts should be administered (see page 219)

SPRUE

(Anemia of Sprue code No 501 703)

Sprue is a chronic disease of undetermined cause (probably due to nutritional deficiency) characterized by sore mouth, glossitis, indigestion and recurrent diarrhea with steatorrhea. It results in anemia, asthenia, emaciation and even death. The anemia may be microcytic hypochromic, normocytic hypochromic or macrocytic hyperchromic (megaloblastic).

Treatment

A Specific Measures

- 1 For hypochromic anemia. Oral or intravenous administration of iron (see page 219)
- 2 For macrocytic hyperchromic anemia (with megaloblastosis)
 - a Corticotropin (ACTH) or one of the steroids (see p. 424) are important advances in the treatment of this form of anemia in non-tropical sprue. Improvement in the anemia is thought to be the result of increased absorption from the gastrointestinal tract of nutrients in food including hemopoietic factors (vitamin B₁₂, folic acid, etc.)
 - b Alternative therapy. If megaloblastic anemia of sprue fails to respond to steroids or corticotropin (ACTH) therapy give one of the following:
 - (1) Vitamin B₁₂ U.S.P. 15-30 micrograms I.M. 1-2 times per week until remission is obtained and then 10-15 micrograms I.M. every 1-2 weeks
 - (2) Folic Acid U.S.P. 10-15 mg ($\frac{1}{6}$ - $\frac{1}{4}$ gr.) daily orally or preferably I.M.
 - (3) Liver Injection Crude U.S.P. 4 cc (1 dr.) I.M. daily

B General Measures

- 1 High albumin, high protein, low fat, high vitamin diet
- 2 Plasma and blood transfusions, nilly prescribed for severe hypoproteinemia and anemia
- 3 Corticotropin (ACTH) or the steroids may be used in the hypochromic form in disease related for correction of the megaloblastic anemia and apnea (see page 423). These substances increase the absorption of nitrogen, fat and other nutrients from the gastrointestinal tract.
- 4 If hypoproteinemia persists Menadione Sodium Bisulfite U.S.P. 10 mg ($\frac{1}{6}$ g.) I.M. or I.V. Stat followed by 5 mg ($\frac{1}{12}$ gr.) orally b.i.d. or vitamin K₁ tablets (Mephyton®) 5-15 mg ($\frac{1}{12}$ - $\frac{1}{4}$ g.) or more orally daily
- 5 Calcium Chloride Phosphate or Gluconate U.S.P. 2 Gm (30 gr.) daily i.d. and vitamin D 5000-20,000 units if hypocalcemia or tetany exist
- 6 Vitamin replacement by mouth

OTHER MACROCYTIC ANEMIAS

This group includes (1) nutritional macrocytic anemia, (2) megaloblastic anemia of infancy and (3) megaloblastic anemias secondary to disease of or operative procedures on the gastrointestinal tract.

Treatment

- A Specific Measures Give folic acid crude liver extract and vitamin B₁₂ as for *ap* use (see pag 226)
- B General Measures Provide an adequate high protein high vitamin diet

APLASTIC ANEMIA (code No 501 900 0)

An acute or sometimes chronic disease of the hemopoietic system characterized by an altered production of red blood cells resulting from a depressed or exhaustion of the bone marrow. The condition may be secondary to known marrow poisoning but also occurs in the primary or idiopathic form

Diagnosis

- A History of exposure to marrow toxins (e.g. hemolysis certain drug and irradiation) is often obtained. Aplastic anemia is a persistent progressive anemia which like certain other anemias fails to respond to liver iron or diet therapy. Other causes of an anemia cannot be demonstrated. Bleeding tendency is common
- B Laboratory Findings
- 1 Anemia is usually normochromic normocytic
 - 2 Bone marrow often (not invariably) shows aplasia with fatty and fibrous replacement
 - 3 Leukopenia and thrombocytopenia are usually marked

Treatment

- A Specific Measures None are known
- B General Measures
- 1 Transfusion Repeated transfusion with a carefully typed and cross matched whole blood may prolong life for variable periods. Rarely patients who quit and cease all transfusions may go into spontaneous remission.
 - 2 Discontinue all unnecessary medication
 - 3 Remove patient from exposure to suspected toxins
 - 4 Diet Provide diet with adequate vitamins and minerals
 - 5 If alive and if aminotherapy should be given an adequate trial but is of little value in true aplastic anemia

HEMOLYTIC ANEMIAS

Classification (Modified after Dameshek)

- A Hereditary Defects of red blood cells show an apparent morphological defect which is an inherited susceptibility to destruction to hemolysis
- 1 Spherocytosis (familial) anemia (normal red cells) (congenital hemolytic anemia) (code No 513 092)
 - 2 Thalassemia (Mediterranean Cooley) anemia (familial) (erythroblastic anemia) (code No 501 997)
 - 3 Sickle cell anemia (Negro) (code No 513 94)
 - 4 Other disorders with abnormal hemoglobins

- B Acquired Defect (Acquired Hemolytic Icterus code No 513 911 9)** Red blood cells are originally morphologically normal. Etiology includes the following:
- | | |
|--------------------------------------|---|
| 1 Infections bacterial and protozoal | 4 Immune hemolysis |
| 2 Toxins venoms drugs and chemicals | 5 Agglutination |
| 3 Physical agents | 6 Abnormal splenic mechanisms hypersplenism etc |
| | 7 Certain ovarian cysts |
- C Unknown Defect (code No 513 900 9)**

Diagnosis**A History**

- 1 Familial or racial hemolytic tendencies (hereditary)
- 2 Exposure to infections toxins agglutinins (acquired)
- 3 Symptoms of anemia (weakness dizziness palpitation and dyspnea) and hemolysis (fever chills abdominal pain and muscle cramps)
- 4 The acute hemolytic crisis is characterized by sudden onset of fever anemia icterus splenomegaly with tenderness and shock

B Physical Examination Pallor icterus tachycardia and fever may be present in all types. Splenomegaly and hepatomegaly occur in the acquired and hereditary types.

C Laboratory Finding

- 1 Increased blood destruction gives rise to:
 - a Normocytic anemia
 - b Bilirubinemia
 - c Hemoglobinuria (see table on page 230)
 - d Increased urinary urobilinogen (urine dark)
- 2 Morphologic red blood cells: Spherocytes target cells or sickle cells (see leucocytes and blood)
- 3 Altered red blood cell fragility (always present in hereditary types)
- 4 Increased blood form factor is evidenced by bone marrow hypoplasia of erythrocytes and absence of immature erythrocytes
- 5 Leukopenia sometimes present in the acquired form
- 6 Detection and identification of abnormal hemoglobin which give rise to hereditary trait and anemia. This requires specialized chemical and electrophoretic techniques

Treatment of Acute Hemolytic Anemia (Hemolytic Crisis)

Patient must be treated to avoid hypotensive possibilities

A Severe Form

- 1 Treat shock (see page 28) and attempt anuria. Careful observation of clinical progress is essential.
- 2 Whole blood transfusion. Blood must be carefully typed (major group and Rh type) and cross matched both at room and body temperatures. Secondary reactions may occur even with a careful cross matching. Sturgeon recommends a cautious preliminary administration of 50% of a suitable blood followed by an observation period of 1 hour. If no reaction occurs the remainder of the blood may be given over a 2 to 3 hour period.
- 3 Plasma. If patient cannot tolerate whole blood transfusions (because of hemolysis of injected red cells), give plasma transfusions when necessary to combat shock.

- 4 Specific use should be tried when known
 - a Infectious Employ specific ant infective and supportive measures (see pages 496 to 514)
 - b Do continue drugs or remove from contact with poisons or other hemolysins
- 5 Corticotropin (ACTH) and the steroids may produce striking remissions of the hemolytic reaction and at last temporarily the patient easier until such time that other more specific measures can be safely instituted. For dosage of ACTH and cortisone see page 424
- 6 Splenectomy After shock and if we have subsided and patient a general physical status has improved sufficiently consider for early splenectomy. If hemolytic shock is progressive despite vigorous supportive measures (up to 3 to 4 500 c.c. of packed cells) emergency splenectomy may be indicated. When the cause is unknown and reaction has been severe consider splenectomy after patient has recovered from the hemolytic crisis. Splenectomy is not generally as successful in the acquired form as it is in the familial type and is generally without benefit in sickle cell and familial erythroblastic anemias
- Mild Form If the hemolytic reaction is mild only treatment with ant infective agent and corticotropin or cortisone may be necessary. In the familial type even though the patient is asymptomatic splenectomy may be advisable

Treatment of Chronic Ph

- A Instruct patient to avoid strenuous exercise infection exposure to temperature extremes and ingestion of or contact with drug or toxin
- B Splenectomy If patient fails to improve on conservative therapy consider splenectomy (see above). When abnormal antibodies (iso and auto antibodies) are present the condition is less often amenable to splenectomy
- ✓ C Cobalt chloride, 200 mg orally daily has been employed in the hemolytic phases of sickle cell and Cooly anemia. Aid in being generally ineffective in the hemolytic phase of alt r g thyroid function

HEMOGLOBINURIAS

Diagnosis (See table on the following page)

Treatment

- A Specific Measures Remove or treat causative factor
 - 1 Poxymaloid hemoglobinuria. Treatment of syphilis p. 440 (see page 440)
 - 2 Fv m. Prohibiting consumption of v.b. and
- B Symptomatic and Supportive Measures
 - 1 Hemolytic symptoms
 - a Tetraethylammonium chloride (see page 228)
 - b Testosterone and muscular aches and pain symptomatically
 - 2 Anemic symptoms. Test acid to type and severity

DIAGNOSIS OF HEMOGLOBINURIAS

Disease	Precipitated By	Positive Laboratory Tests
Paroxysmal cold hemoglobinuria (code No 510 500)	Chilling or cold	Blood test for syphilis Donath Landsteiner test
Paroxysmal nocturnal hemoglobinuria (code No 510 500)	?	Acid hemolysis test Hemosiderinuria test
Favism (code No 010 3761)	Ingestion of fava beans	None
March hemoglobinuria (code No 510 500)	Exercise	None

Prophylaxis

- A Paroxysmal Cold Hemoglobinuria Protect against chilling or cold
- B March Hemoglobinuria Avoid strenuous exercise

POLYCYTHEMIA VERA (ERYTHREMIA) (code No 501 TH)

A chronic disease of the hemopoietic system of unknown etiology characterized by overactivity (erythroblastic) of the bone marrow with resultant overproduction of red cells and hemoglobin. It is manifested by a reddish purple hue to the skin, increased blood volume, capillary engorgement, hemorrhages, venous thrombosis, arterial hypertension, hepatomegaly and splenomegaly, and symptoms referable to multiple organ systems. It is to be differentiated from the polycythemia that may occur secondarily to known physiological states which also cause increased bone marrow activity.

Treatment

- A Definitive Measures To reduce the total red blood cell volume
- 1 Venesection (phlebotomy)

a. Utilize careful blood hematocrit determination in following efficacy of treatment

b. Remove 500 cc of blood daily until the blood hematocrit reaches a normal level. Subsequently 500 cc phlebotomy every 2 to 3 months may be sufficient to control mild cases
 - 2 Irradiation Inhibition of red cell formation
 - a. Radioactive phosphorus (P^{32}) This is the most effective anti polycythemic agent available at present. Its use is restricted to institution equipped to handle radioactive material. It is indicated in patient in which the polycythemia cannot be controlled readily by venesection alone and especially in patients with a history of thrombotic or thrombophlebotic episodes. 4 to 6 milluries of P^{32} (as phosphate salt) in 2 to 6 cc of isotonic (1/2 to 1/4 M) sodium phosphate solution is given I.V. If the polycythemia is not controlled following a single I.V. injection, subsequent injections of 3 to 6 milluries are given at intervals

of 2 months until the disease is brought under control

b. X ray irradiation Whole body or spray irradiation may be of benefit when given in repeated dosages. Irradiation of the long bones has proved to be less satisfactory than whole body irradiation in controlling the disease.

3. Antipolythemic drugs

Phenylhydrazine hydrochloride or acetylphenylhydrazine. Follow patient carefully clinically and with blood studies during and after therapy. The compounds are most safely used if they are administered as maintenance therapy after the hematocrit has been raised to normal by repeated venesections. Give 0.1-0.3 Gm (1½-3 gr) by mouth weekly as a maintenance dose. The use of phenylhydrazine to lower an elevated erythrocyte count obviates the use of venesections to establish normal red cell and hematocrit levels. It has reduced procedure. Anorexia, nausea, and vomiting are the principal disadvantages of phenylhydrazine therapy.

■ Triethylethylamine (TEA) has been employed, but experience has been limited.

B. General Measures

1. Provide symptomatic relief as needed.
2. Diet. The diet should be adequate and nutritious. There is no rational restriction of diet, excluding no small amounts of blood-building foods.
3. Inform patient regarding the nature of his disease.

■ Treatment of Complications. Varies with the status of the pancytopenia and the relation of complications to therapy as well as with the nature and site of the complication. Thrombosis and hemorrhage are common complications.

ACUTE AGRANULOCYTOSIS (code No. 503.7911) (Agranulocytic Angina)

An acute and fulminant disease usually fatal in adults. Characterized by extreme granulocytopenia which is followed by a fulminating sepsis associated with ulceration of skin and mucous membranes. It is known to be caused by certain drugs and chemically but is sometimes of unknown origin.

D. Diagnosis

A. History of Medication With Certain Drugs. Sulfonamides, pyrimethamine, chlorpromazine, methoprene, Biarmen, thiouracil and related compounds, gold, and other heavy metals. It often results from Tridione, Valiolid, Therafil, barbiturate (?rare), aspirin (?rare).

B. Physical Examination. Sudden onset of fever and fever in inflammation. Swelling of mucous membranes of throat and frequently of other areas of the body. Gangrenous ulcers.

C. Laboratory Findings

1. Severe leukopenia and granulocytopenia.

232 Agranulocytosis

- a WBC usually < 2500/cu mm
- ii Granulocytes < 50% of differential count (may be completely absent)
- 2 Anemia absent (cf aplastic anemia leukemia etc)

Treatment

A Emergency Measures

- 1 Discontinue all unnecessary medication and always discontinue offending drug promptly
- 2 Control of infection during the period of profound neutropenia
 - a Antibiotics May be used prophylactically to prevent infection or therapeutically to control infection when it develops. The chief disadvantage of routine prophylactic use of broad spectrum antibiotics (tetracyclines, chloramphenicol, etc) is that if infection develops the causative organism (especially the staphylococcus) may be resistant to a wide variety of antibiotic preparations. Therefore it is advisable under hospital conditions to withhold antibiotic therapy until infection develops, then isolate the causative organism perform antibiotic sensitivity tests and administer the antibiotic to which the organism is most sensitive. During the period required to culture the organism and perform the sensitivity tests (48 hours or more after the first signs of infection have developed) a broad spectrum antibiotic should be given. For details concerning the selection and administration of antibiotics see page 514.
 - b Sulfonamides (auton) may be employed if appropriate antibiotic preparations are not available providing sulfonamides are not the offending drug.
- 3 Granulocyte formation. Purine nucleotide, folic acid, vitamin B₁₂ and pyridoxine are of doubtful value in producing leukopoiesis.

B General Measures

- 1 Hospitalize and isolate from avoidable infections
- 2 Bed rest
- 3 Careful skin and oral hygiene
 - a Saline mouth wash
 - b Local treatment of skin and mucous membrane ulcers (see page 86)
- 4 Nourishing liquid or soft diet as tolerated by painful buccal lesions. Parenteral feeding may be necessary (see page 25)
- 5 Follow patient blood status by serial blood counts

Prophylaxis

A patient receiving a drug capable of producing agranulocytosis must have regular and frequent WBC during the course of the therapy. The patient should also be cautioned to discontinue the drug promptly in the event of sore throat, skin rash, chills, or fever and to report to his doctor at once.

LEUKEMIAS

Leukemia is an acute or chronic invariably fatal disease (a group of diseases?) of unknown etiology involving the hematopoietic tissues and usually giving rise to abnormal leukocytosis and associated anemia. Immature leukocytes are usually present in the peripheral blood although there may be no alteration in the blood count or there may be merely an increase in the number of normal leukocytes.

ACUTE LEUKEMIA (code No 99 7921)

Diagnosis (See table on page 234)Treatment

Treatment is only palliative although this may change with the new chemotherapeutic agents. Radiation therapy is usually of more harm than benefit.

A Combat anemia and bleeding tendency by repeated blood transfusions as indicated. Improvement is usually transient although short remissions have been reported.

Antimetabolite Therapy1. Folic acid antagonists (Use with caution.)

a Agents most commonly used

(1) Aminopterin (4 aminopteroylglutamic acid)

(2) Methotrexate (formally called amethopterin) (8 amino methylpteroylglutamic acid)

b Indications for use. Acute leukemia especially in children. Some degree of improvement may be expected in approximately two thirds of the children treated and marked improvement will occur in about 80%. In children with acute leukemia the remission rate obtained with folic acid antagonists is much lower (12 to 15%).

c Dosage. Folic acid antagonists may be given orally or in the form of a buccal paste. The size of the dose should be gauged by the age, weight and physical condition of the patient. Remember that the range between the therapeutic and the toxic dose is very slight. Patients receiving these drugs must be watched closely and frequent blood counts and bone marrow examinations made. Treatment must be discontinued promptly if toxic symptoms appear. If pancytopenia and hypoplasia of the bone marrow develop.

(1) Aminopterin Children 0.5 to 1.0 mg ($\frac{1}{120}$ to $\frac{1}{60}$ gr) daily divided into 1 to 2 doses ($\frac{1}{60}$ to $\frac{1}{30}$ gr) daily.

(2) Methotrexate Children 2.5 to 5.0 mg ($\frac{1}{24}$ to $\frac{1}{12}$ gr) daily divided into 5 to 10 mg ($\frac{1}{12}$ to $\frac{1}{6}$ gr) daily.

d Toxicity. The most important toxic manifestation is stomatitis, diarrhea, ulcers, lesions at any site in or throughout the gastrointestinal tract, gingivitis, stomatitis, hemorrhage (sometimes massive) and pancytopenia associated with severe hypoplasia or aplasia of the bone marrow.

e Methods of minimizing toxicity (not always effective)

(1) Prompt discontinuation of folic acid antagonists therapy.

DIFFERENTIAL DIAGNOSIS OF THE LEUKEMIAS AND RELATED DISORDERS

Disease	Duration	Splenomegaly	Hepatomegaly	Lymph nodes	WBC		Bone Marrow
					Total Count (usual range)	Differential	
1 Chronic granulocytic leukemia (code No 502 792)	36 mos (8 mos to 16 yrs)	+++	++	±	20 000 500 000	Immature myeloid cells	Myeloid infiltration
2 Chronic lymphocytic leukemia (code No 503 792)	42 mos (8 mos to 8 yrs)	++	+	++	30 000 100 000	Immature lymphoid cells	Lymphocytic infiltration
3 Chronic monocytic leukemia (code No 506 792)		±	±		25 000 100 000 (2 000 500 000)	Immature monocytic cells	Monocytic infiltration
4 Acute leukemia (code No 50 7921)	8 wks (2 wks to 8 mos)	±	±	±	15 000 30 000 (5 000 100 000)	Blast cells (often undifferentiated)	Leukemic infiltration Blast cells may be difficult to differentiate
5 Aleukemic myeloid (code No 502 7923)		+	±	±	4 000 (1 000 6 000)	Immature cells (few)	Leukemic infiltration (not always)
Agnogenic myeloid metaplasia of spleen (code No 520 858)	11 yrs	+	±	±	20 000 50 000	Immature myeloid cells Nucleated red cells	Normal aplastic or hyperplastic marrow

Not The anemia associated with the leukemias is usually normocytic and normochromic and may vary from mild to severe. The platelets are usually increased in chronic granulocytic leukemia but may be decreased in all other leukemias. The platelet is rarely associated with the leukemia.

- (2) Parent r l administration of Leucovorin C l ium
N N D (sy thetic Leuco o toc citrovorum factor) in
a ratio of 1 mc vorin to a tagonist of 1 l 10 l
- (3) Blood t ansf sio Spaced at intervals to maintain
RBC at 2 5 3 0 million/cu mm
- (4) Ant bi tics If inf cti n dev lops (use appropriat anti
biotic aft r causative o ganism has been isolat d and
s nsitiv ty tests p e formed)

2 Purin a t go ists These ag nt only recently introduced
are st l in an inv stigativ st g of developm nt but in
gen III th y appe r t be less toxic than th f l l acid
antagonists

Ag ts available for us

- (1) Me ptopurin N N III (Purin thol® 6 M P)
- (2) 6 Chlo opu ine
- (3) O D a oacetyl l e ine (azas in)

b I dicatio s f r use Ac te le k m sp ially in adult
An initial r mi slo rate of approximat ly 55% h been
epo ted i adult and 50% in childre f l l wing t s t
m t with 6 m r ptopuri e Th stat s l hlo opurine
d saseri remain u determ d at p e t

c D sag and pro ed re

- (1) 6 Me captopu ine (6 M P) 2 5 4 0 mg /Kg body
weight/d y
- (2) 6 Chlo pu ine 10 0 20 0 mg /Kg body w ight/day
- (3) Az e i e 2 0 mg /Kg body weight/day

This compound admin st ed orally in a ingle
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th the ap utic and the toxic d e is wider than it is with
th f l l acid antagon st and h n pu in ant gonl t
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is di ontin d and the pati t i watch d l ely If
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2 5 mg /Kg B dy weight/day) In a ts in whi h e ist
an i 6 m r captopurin appe to b de loping f
v bl p om tim s an be obt ined by givi g
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Th fulu f p e ant g nust d pend upo
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than th p ipher l blood is employ d as th e in ipal
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d Tox c ty T ric manif stations of mild d gr har
s d by ano xia and nans f qu tly e obs ved

More severe toxic manifestations include vomiting, stomatitis, diarrhea, melena and rarely fever. Treatment should be discontinued only if the more severe toxic manifestations develop. Suppression of hemopoiesis (pancytopenia, hypoplastic bone marrow) is not indicated as a toxic manifestation since it may employ drugs with antileukemic activity. Irreversible suppression of hemopoiesis has not been observed in patients treated with 6-mercaptopurine. Toxic manifestations usually disappear within 3 to 4 days after institution of therapy.

Stimulation with ACTH The compound will induce lysis and hemoglobin improvement in 50-65% of children with acute leukemia, but the remission rate in adult acute leukemia is low (about 12%). It is particularly useful in whom temporary remission has been induced but has become refractory to therapy. Course of therapy (see page 423).

CHRONIC LEUKEMIAS (code No 50 792)

Diagnosis (See table on page 234)

Treatment

Treatment is only palliative. Think in terms of controlling all phases of the disease so as long as possible, but do not place emphasis on the attempt at combating leukocytes. Some patients may require treatment for periods of years.

A. Radiation of Leukemic Enlargement and Infiltration Pressure symptoms arising from enlarged glands and viscera may produce mechanical obstruction of the respiratory tract or involvement of vital structures. Involvement of vital structures with leukemic infiltration may occasionally require surgical intervention although the prognosis is poor.

1. Irradiation

X-ray The effectiveness of treatment may be utilized by administering the appropriate dose of radiation (or x-ray) to the lymphatic system. The administration of radiation to the lymphatic system is indicated in the treatment of leukemic infiltration of the lymphatic system. The administration of radiation to the lymphatic system is indicated in the treatment of leukemic infiltration of the lymphatic system. The administration of radiation to the lymphatic system is indicated in the treatment of leukemic infiltration of the lymphatic system.

2. Chemotherapy The use of chemotherapeutic agents having antileukemic activity is an effective method of treatment. The use of chemotherapy is indicated in the treatment of leukemic infiltration of the lymphatic system. The use of chemotherapy is indicated in the treatment of leukemic infiltration of the lymphatic system. The use of chemotherapy is indicated in the treatment of leukemic infiltration of the lymphatic system.

treatment are markedly enlarged lymph nodes especially if causing pleural symptoms anemia due to bone marrow infiltration or extensive leukemic infiltration of viscera skin etc

(1) Triethylene Melamine N N D (TEM) dispensed in 1 mg ($\frac{1}{60}$ gr) and 5 mg ($\frac{1}{12}$ gr) oral tablets. This relatively new drug appears to be the agent of choice because of its pronounced destructive effect on the mature lymphocyte. Use with caution especially if the leukocyte count is below 50,000 cells per cu mm. If the leukocyte count is in excess of 50,000 cells per cu mm give 5 mg ($\frac{1}{12}$ gr) of TEM together with 2 Gm (30 gr) of sodium bicarbonate orally 1 hour before breakfast (Sodium bicarbonate prevents reaction of TEM with substances in the gastrointestinal tract and permits absorption of the entire dose). On the following day give 2.5 mg ($\frac{1}{25}$ gr) of TEM plus 1 Gm (15 gr) of sodium bicarbonate 1 hour before breakfast. Then wait 1 week and check blood counts. Repeat the administration of TEM at weekly intervals reducing the weekly dose to 5 mg ($\frac{1}{12}$ gr) when the leukocyte count falls below 50,000 cells per cu mm and to 2 to 3 mg as the leukocyte count approaches normal. When normal leukocyte values have been attained discontinue TEM therapy. Remission may last from 6 to 24 months. How ever during remission blood examinations should be made at intervals of 1 or 2 months.

If the initial leukocyte count is above normal but below 50,000 cells per cu mm give 5 mg ($\frac{1}{12}$ gr) of TEM orally together with sodium bicarbonate once each week until the desired result is obtained.

(2) Nitrogen mustard (HN) Remission is obtained with nitrogen mustard in chronic lymphocytic leukemia usually are shorter than those obtained with TEM and therefore TEM is preferred to nitrogen mustard therapy. For details of administration of nitrogen mustard see page 241.

- b Chronic granulocytic leukemia. In contrast to chronic lymphocytic leukemia chronic granulocytic leukemia is always should be treated at the time the diagnosis is established. Agent available for treatment is listed in red reference.

(1) Triethylene Melamine, N N D (TEM) Quite effective in controlling chronic granulocytic leukemia for long periods of time. It has the advantage of giving remission lasting from 3 to 10 months but due to the large dose employed it has the disadvantage of causing nausea and vomiting (sometimes severe) in some patients for several hours after administration. However nausea and vomiting may be minimized by administering 25 to 75 mg ($\frac{3}{8}$ to $\frac{1}{4}$ gr) of chlorpromazine (Thorazine®) before and at 3 hour intervals after the administration of TEM. It is important to remember that the dosage schedule for TEM in chronic

granulocyte leukemia is significantly higher and therefore quite different from that used in chronic lymphocytic leukemia.

If the leukocyte count is in excess of 50,000 cells per cu. mm. give 10 mg ($\frac{1}{16}$ gr.) of TEM and 2.4 Gm (30 mg gr.) of sodium bicarbonate orally 1 hour before breakfast. On the following day give 5 mg ($\frac{1}{32}$ gr.) of TEM and 2 Gm (30 gr.) of sodium bicarbonate 1 hour before breakfast. Repeat the above procedure at weekly intervals after first performing blood counts. Reduce weekly dose of TEM when the leukocyte count falls below 10,000 cells per cu. mm. and discontinue therapy when leukocyte values approach normal.

If the initial leukocyte count is below 50,000 cells per cu. mm. start with 10 mg ($\frac{1}{16}$ gr.) of TEM weekly. If response to this dose is unsatisfactory give 12.5 mg ($\frac{1}{4}$ gr.) each week.

- (2) **Bulfan** (N.D. Myleran), dispensed in 2 mg ($\frac{1}{30}$ gr.) tablets for oral use. Useful only in patients having chronic granulocytic leukemia with high leukocyte count. Do not use in patients with normal or subnormal leukocyte counts. Give 4 mg ($\frac{1}{15}$ gr.) daily by mouth until maximum hematologic improvement achieved, performing blood counts every second third day. Thrombocytopenia of serious degree may develop on daily oral doses of 10 mg ($\frac{1}{6}$ gr.) or more. When the leukocyte count has returned to a normal level, place the patient on a maintenance dosage of 2.4 mg ($\frac{1}{30}$ - $\frac{1}{15}$ gr.) daily. Myleran is ineffective in acute leukemia and in chronic lymphocytic leukemia.
- (3) **Marcapocuring** (M. & B. Purinethol), 50 mg ($\frac{3}{4}$ gr.) tablets for oral use. Give 3.5 mg ($\frac{1}{20}$ - $\frac{1}{12}$ gr.) /Kg./day in a single or equally divided dose by mouth until the leukocyte count approaches normal. Maintain the therapy (2.5 mg /Kg./day or slightly less) than is required to control the disease. S.A.P. is ineffective in chronic lymphocytic leukemia.
- (4) **Agathane** (ethyl carbamate), dispensed in 0.5 Gm. ($\frac{1}{2}$ gr.) plain or enteric coated tablets for oral use. This compound will control chronic granulocytic leukemia for relatively long periods of time but it has the disadvantage of causing nausea and anorexia in a high proportion of patients and vomiting in some. Give 0.5 - 1.0 Gm. ($\frac{1}{2}$ - 1 gr.) tid until leukocyte count returns to normal, then place on maintenance therapy giving the smallest amount necessary to keep the leukocyte count at or near normal levels.
- (5) **Powder solution** (Potassium Asenite Solution, N.F.) may be of value when radiation therapy is contraindicated or unavailable.

For oral administration begins with an initial dose of 0.3 cc (5 gtt or 5 min.) tid orally for 2 days. This dose is increased by 0.05 (1 gtt or 1 min.) every other day until a dose of 0.8 (10

treatment are markedly enlarged lymph nodes especially if causing pressure symptoms anemia due to bone marrow infiltration or extensive leukemic infiltration of viscera skin etc

(1) Triethylene Melamine N N D (TEM) dispensed in 1 mg ($\frac{1}{40}$ gr) and 5 mg ($\frac{1}{17}$ g) oral tablets This relatively new drug appears to be the agent of choice because of its pronounced destructive effect on the mature lymphocyte Use with caution especially if the leukocyte count is below 50,000 cells per cu mm If the leukocyte count is in excess of 50,000 cells per cu mm give 5 mg ($\frac{1}{17}$ gr) of TEM together with 2 Gm (30 gr) of sodium bicarbonate orally 1 hour before breakfast (Sodium bicarbonate prevents reaction of TEM with substance in the gastrointestinal tract and permits absorption of the entire dose) On the following day give 2.5 mg ($\frac{1}{25}$ gr) of TEM plus 1 Gm (15 gr) of sodium bicarbonate 1 hour before breakfast Then wait 1 week and check blood counts Repeat the administration of TEM at weekly intervals reducing the weekly dose to 5 mg ($\frac{1}{17}$ gr) when the leukocyte count falls below 50,000 cells per cu mm and to 2 to 3 mg as the leukocyte count approaches normal When normal leukocyte values have been attained discontinue TEM therapy Remission may last from 6 to 24 months However during remission blood examinations should be made at intervals of 1 to 2 months

If the initial leukocyte count is above normal but below 50,000 cells per cu mm give 5 mg ($\frac{1}{17}$ gr) of TEM orally as together with sodium bicarbonate once each week until the desired result is obtained

(2) Nitrogen mustard (HN₂) Remissions obtained with nitrogen mustard in chronic lymphocytic leukemia usually are shorter than those obtained with TEM and therefore TEM is preferred to nitrogen mustard therapy For details of administration of nitrogen mustard see page 241

- b Chronic granulocytic leukemia In contrast to chronic lymphocytic leukemia in which granulocytic leukemia always should be treated at the time the disease is first discovered Agents available for treatment are listed in order of preference

(1) Triethylene Melamine N N D (TEM) Quite effective in controlling chronic granulocytic leukemia for long periods of time It has the danger of giving remissions lasting from 3 to 12 months but due to the large doses employed it has the disadvantage of causing nausea and vomiting (sometimes severe) in some patients for several hours after administration However nausea and vomiting may be minimized by administering 25 to 75 mg ($\frac{3}{8}$ to $1\frac{1}{4}$ g) of chlorpromazine (Thorazine) before and at 2-hour intervals after the administration of TEM It is important to remember that the dosage schedule for TEM is

granulocytic leukemia is significantly higher and therefore quite different from that used in chronic lymphocytic leukemia.

If the leukocyte count is in excess of 50,000 cells per cu mm give 10 mg ($\frac{1}{8}$ gr) of TEI and 3.4 Gm (30 mEq) of sodium bicarbonate orally 1 hour before breakfast. On the following day give 5 mg ($\frac{1}{12}$ gr) of TEI and 2 Gm (30 mEq) of sodium bicarbonate 1 hour before breakfast. Repeat the above procedure at weekly intervals after first performing blood counts. Reduce weekly dose of TEI when the leukocyte count falls below 50,000 cells per cu mm and discontinue therapy when leukocyte values approach normal.

If the initial leukocyte count is below 50,000 cells per cu mm start with 10 mg ($\frac{1}{8}$ gr) of TEI weekly. If response to this dose is unsatisfactory give 12.5 to 15 mg ($\frac{1}{4}$ to $\frac{1}{3}$ gr) each week.

- (2) **Buulf N N D (Mylar[®])** dispersed in 2 mg ($\frac{1}{30}$ gr) tablets for oral use. Useful only in patients having chronic granulocytic leukemia with high leukocyte counts. Do not use in patients with normal or subnormal leukocyte counts. Give 4 mg ($\frac{1}{15}$ gr) daily by mouth until maximum hematology improvement is achieved performing blood counts every second or third day. Thrombocytopenia of serious degree may develop on daily doses of 12 mg ($\frac{1}{8}$ gr) or more. When the leukocyte count has returned to a normal level place the patient on a maintenance dose of 2.4 mg ($\frac{1}{30}$ to $\frac{1}{15}$ gr) daily. Mylar is ineffective in acute leukemia and in chronic lymphocytic leukemia.
- (3) **Mercaptopurine N N D (Purinethal[®])** 50 mg ($\frac{3}{4}$ gr) tablets for oral use. Give 3.5 mg ($\frac{1}{20}$ to $\frac{1}{12}$ gr) /Kg/day in a single or equally divided doses by mouth until the leukocyte count approaches normal. Maintenance therapy (2.5 mg /Kg/day or slightly less) then is required to control the disease. S.M.P. is ineffective in chronic lymphocytic leukemia.
- (4) **Uristad[®] (thylarhamat)** dispensed in 0.5 Gm ($\frac{1}{2}$ gr) plain tablets for oral use. This compound will control chronic granulocytic leukemia for initially a period of time but it has the disadvantage of causing nausea and anorexia in a high proportion of patients and vomiting in some. Give 0.5 to 1.0 Gm ($\frac{1}{2}$ to 1 gr) tid until leukocyte count returns to normal, then place on maintenance therapy giving the smallest amount necessary to keep the leukocyte count at a normal level.
- (5) **Kowler's solution (Potassium Asemit Solutio N F)** may be of value when radiation therapy is contraindicated or unavailable.

Forker's technique of administration begins with an initial dose of 0.3 cc (5 gtt or 5 min) tid orally for 2 days. This dose is increased by 0.05 cc (1 gtt or 1 min) every other day until a dose of 0.8 cc (10

gtt or 10 min) t i d is reached Further incr a e of d = 0.05 cc (1 gt = 1 min) daily until toxic symptoms occur (anorexia, nausea and vomiting, diarrhea) or the leukocyte count approaches normal Discontinue the drug for 2-5 days and then increase the maximum dose by 0.05 cc (1 gt or 1 min) daily until a maintenance level of 0.3-0.5 cc (5 gtt or 5 min) t i d is reached This dose is continued indefinitely keeping the patient under careful observation

(6) Nitrogen mustard (HN₂) May produce full clinical remissions in certain early and moderately advanced cases of chronic granulocytic leukemia these are similar to x-ray response but are of short duration Nitrogen mustard is not recommended for a cure leukemia (see page 241)

B Treatment of Certain Hematologic Abnormalities

1 Anemia Determine whether or not the anemia is myelophthytic or hemolytic

a Myelophthysis Treat with the appropriate anti-leukemic chemotherapeutic agent Adequate nutrition including supplementary vitamins is important but the administration of tonics is of no value Periodic transfusions of whole blood may be necessary until the desired hemotherapeutic result has been attained

b Hemolysis Treat with steroids or corticotropin (ACTH) (see page 228) If the hemolytic anemia of chronic leukemia cannot be controlled by hormone therapy splenectomy may be necessary

2 Bleeding tendencies Purpura and hemorrhagic phenomena are often due to the associated thrombocytopenia Transfusions of fresh whole blood are indicated Toluene blue reported to be of value

3 Hemolytic crises See page 228

C Other Symptomatic Measures

1 Treatment of purpura See page 68

2 Treatment of ulcerative stomatitis See page 261

LYMPHOMAS (code No 820) and LYMPHOSARCOMAS (code No 821)

A large ill defined group of disease characterized by progressive proliferation of the hematopoietic tissues and manifested by variable involvement of lymph nodes spleen bone marrow liver and other reticuloendothelial structures together with constitutional symptoms of fever weight loss hemorrhagic tendencies and anemia The exact interrelationship of these diseases are not known therefore all classifications remain arbitrary and controversial Clinical types are often indistinct and may merge into one another

Treatment

Certain general principles of management may apply to these diseases as a group

A General Measures Measures directed toward maintaining optimum general health should be carried out both as a means of influencing the course of the disease and as a means of preventing complications.

B Radiation and Drug The effects of radiation and certain chemotherapeutic drugs may be palliative or curative but results are difficult to evaluate. The susceptibility to a specific therapeutic agent and the duration of effectiveness (for both palliation and cure) will vary not only with the disease but also with the stage of the disease. Previous therapy and the response of the patient to patient. The table on page 236 outlines the response of the various histologic types of the disease to the various therapeutic agents.

Although clinical experience has shown that cure is possible in some cases, the results are not reproducible and the final decision must rest upon a trial of the therapy.

HODGKIN S DISEASE (code No 850 954)

A Pathogenesis and invariably fatal eticuloendothelial granulomatous (lymphomatous?) disease of unknown etiology involving the lymphoid tissues of the body. It is manifested by progressive enlargement of lymph nodes, spleen and other lymphoid structures and constitutional symptoms of fever, weight loss and anemia. The lesions can involve any and all tissues throughout the body. The disease is a neoplastic. Several clinical and pathological types are recognized ranging from a usually more benign form, paraneoplastic, with a survival time of 3 or more years to a rapidly fatal form, sarcoma, with a survival time of less than 1 year. The diagnosis is confirmed by biopsy and confirmed by biopsy and confirmed by biopsy. The condition is not infectious, genetic and is not the same as lymphoma.

Treatment

A Definitive Measures (No known specific therapy is available.)

1 Local Treatment At present local or total body irradiation probably is the palliative measure of choice. Clinical improvement is not definite but there is regression in the size of the involved lymphatic structures and in no way does it alter the disease. The average survival time is probably unchanged but the patient is made more comfortable. Unfortunately, in the best management, survival is only a few months after subsequent occurrence of x-ray therapy. Nitrogen mustards, which have been used in radiation therapy, are not effective in patients.

2 Combination and Intravenous Mustard Therapy may be a more effective method of treatment than either alone.

3 Nitrogen Mustard (methyl bis(2-chloroethyl)amine hydrochloride) (HN_2) HN_2 is present in the nitrogen mustards must be carefully employed. The indication is for the use of a widely disseminated chronic granulomatous Hodgkin's disease which has been refractory to other therapy.

b Chemical granuloma is a Hodgkin's disease with visceral involvement (especially lung parenchyma).

Hodgkin's disease is failing to respond to therapy.

Irradiation

HN_2 should be administered only in a hospital and only by a physician experienced in its use this is because of the complications that may arise as a result of severe toxic reactions. The response is similar to roentgen irradiation but the remission is shorter (usually 1 to 3 months). HN_2 is given I V in a single dose. The average dose is 0.4 mg ($\frac{1}{160}$ gr)/Kg body weight but slightly more or less than this amount may be desirable in certain cases (range 0.3 to 0.6 mg/Kg). HN_2 is stable in dry form but unstable in aqueous solution. Therefore fresh solutions must be used. Add 10 cc ($\frac{1}{2}$ dr) of sterile isotonic sodium chloride solution to 10 mg ($\frac{1}{8}$ gr) of the dry salt in a sterile container. Calculate amount the patient needs and draw this quantity into a sterile syringe of suitable size. Inj slowly taking no less than 10 minutes for the full amount into the stream of an infusion of saline or glucose solution that is being delivered at a rapid rate. Do not inject directly into a vein. Great care should be taken to prevent the HN_2 solution from coming into contact with the skin or escaping from the vein into the surrounding tissues.

- 4 Triethylene Melamine N N D (TEM) (See page 233) Mild cases of chronic granulomatous Hodgkin's disease sometimes can be controlled for months or longer by the oral administration of 50-75 mg ($\frac{1}{12}$ - $\frac{1}{8}$ gr) of TEM given with 2 Gm (30 gr) of sodium bicarbonate 1 hour before breakfast once each month. However TEM is more valuable in treating lymphosarcoma than Hodgkin's disease.

An important use of TEM is intrapleural administration in patients with serous or chylous pleural effusions. After withdrawing as much pleural fluid as possible 5 mg ($\frac{1}{12}$ gr) of sterile powdered TEM is dissolved in 5 cc ($\frac{1}{4}$ dr) of sterile saline solution and injected into the pleural cavity. After withdrawal of the thoracocentesis needle the patient is asked to change his position every 2 minutes for 30 minutes so that the TEM comes in contact with the ten (5 areas of visceral and parietal pleura). This procedure is even more effective in treating serous or chylous pleural effusions in lymphosarcoma but a smaller dose (2.5 mg) of TEM should be given.

- 5 Surgical excision. Wide surgical excision may be indicated for localized lesions especially if it is primary (initial or persistent area). This is a debatable measure.

B General Measures

- 1 Maintaining good living hygiene with adequate diet, exercise and rest.
- 2 Hospitalization is recommended during febrile phases or with other complications of the illness.
- 3 Transfusions of whole blood and other supportive measures should be instituted as the various manifest signs arise.

MULTIPLE MYELOMA (code No 533 8222)

A chronic disease of unknown etiology usually occurring after 40 years of age marked by circumscribed or diffuse proliferation in marrow

hyperplasia of plasma cell and characterised by neuralgic and skeletal pains spontaneous fractures x-ray evidence of skeletal destruction Bone marrow proteinuria anaemia renal insufficiency and an invariably fatal termination

Treatment

A. Definitive Measures

- 1 X-ray therapy may provide symptomatic relief but it is doubtful if it significantly alters the course of the disease
- 2 Urthane® (thylca b m te) Urthan® in dose of 1.5 to 6.0 Gm (22½ to 90 gr) per day as tolerated may provide symptomatic relief but probably does not prolong life Careful follow up with periodic leucocyte counts is not necessary
- 3 Stilbamidine is ethiochrome N N D Formally used to relieve severe skeletal pain in falling to respond to x-ray therapy but since it causes severe intracerebral trigeminal neuralgia in a significant proportion of cases it is wisely used infrequently in the treatment of myeloma When used it is given in freshly prepared solution containing 150 mg (2½ gr) stilbamidine I M or I V daily or very often every day for from 8 to 50 injections The patient should be placed upon a diet low in animal protein Careful assessment of renal function prior to and during drug therapy is necessary Although patients may show temporary clinical improvement the course of the disease remains progressive and fatal

B. General Measures

- 1 Permit optimum general health by adequate diet and sleep
- 2 Caution patient against exposure to undue physical exertion because of susceptibility to fracture
- 3 Whole blood transfusions as needed for anemia
- 4 Analgesics if pain
- 5 Encourage fluid intake in good urine output

BLEEDING DISEASES

The mechanism involved in the maintenance of the coagulability and fluidity of the blood are as yet incompletely understood. The identification of a single once circulating blood regulation mechanism has failed to explain many phases of bleeding phenomena. The thrombolytic mechanisms are (1) clotting defect (2) thrombocyte (platelet) defect and (3) capillary defect. They are all closely interrelated and poorly understood in many bleeding diseases. Common to all is the fact that it is perhaps more important to determine the total picture for the bleeding. It is important to remember that the various individual hemostatic test may be used as a wide variety of disorders and as a single pathognomonic. For simplicity of presentation and for purposes of familiarity however the following classification of bleeding diseases is based upon the clinical classification. One should bear in mind that a clinical diagnosis is a particularly difficult task to establish in terms of absolute deficiency of a single factor. Mi coagulation factor

BLEEDING DISEASES SUMMARY OF DIAGNOSIS AND TREATMENT

Diagnosis	Clinical Features	Laboratory Findings	Differential Diagnosis	Treatment	Prognosis
Congenital Hemophilia A (Factor VIII deficiency)	Onset in infancy Prolonged bleeding time Spontaneous bleeding Hematuria Hemorrhage after surgery	Normal platelet count Prolonged bleeding time Normal clot retraction Normal prothrombin time Prolonged partial thromboplastin time Normal fibrinogen level Normal factor VIII level	Factor VIII deficiency Factor IX deficiency Factor X deficiency Factor XI deficiency Factor XII deficiency	Replacement therapy with Factor VIII concentrate Desmopressin (DDAVP) Antifibrinolytics (e.g., tranexamsic acid)	Good with replacement therapy
Acquired Hemophilia A (Factor VIII inhibitor)	Onset in adulthood Prolonged bleeding time Spontaneous bleeding Hematuria Hemorrhage after surgery	Normal platelet count Prolonged bleeding time Normal clot retraction Normal prothrombin time Prolonged partial thromboplastin time Normal fibrinogen level Low factor VIII level Positive factor VIII inhibitor titer	Factor VIII deficiency Factor IX deficiency Factor X deficiency Factor XI deficiency Factor XII deficiency Factor XIII deficiency Factor VII deficiency Factor VI deficiency Factor V deficiency Factor IV deficiency Factor III deficiency Factor II deficiency Factor I deficiency	Replacement therapy with Factor VIII concentrate Desmopressin (DDAVP) Antifibrinolytics (e.g., tranexamsic acid)	Good with replacement therapy
Congenital Hemophilia B (Factor IX deficiency)	Onset in infancy Prolonged bleeding time Spontaneous bleeding Hematuria Hemorrhage after surgery	Normal platelet count Prolonged bleeding time Normal clot retraction Normal prothrombin time Prolonged partial thromboplastin time Normal fibrinogen level Normal factor VIII level Low factor IX level	Factor VIII deficiency Factor IX deficiency Factor X deficiency Factor XI deficiency Factor XII deficiency	Replacement therapy with Factor IX concentrate Desmopressin (DDAVP) Antifibrinolytics (e.g., tranexamsic acid)	Good with replacement therapy
Acquired Hemophilia B (Factor IX inhibitor)	Onset in adulthood Prolonged bleeding time Spontaneous bleeding Hematuria Hemorrhage after surgery	Normal platelet count Prolonged bleeding time Normal clot retraction Normal prothrombin time Prolonged partial thromboplastin time Normal fibrinogen level Low factor IX level Positive factor IX inhibitor titer	Factor VIII deficiency Factor IX deficiency Factor X deficiency Factor XI deficiency Factor XII deficiency Factor XIII deficiency Factor VII deficiency Factor VI deficiency Factor V deficiency Factor IV deficiency Factor III deficiency Factor II deficiency Factor I deficiency	Replacement therapy with Factor IX concentrate Desmopressin (DDAVP) Antifibrinolytics (e.g., tranexamsic acid)	Good with replacement therapy
Congenital Hemophilia C (Factor XI deficiency)	Onset in infancy Prolonged bleeding time Spontaneous bleeding Hematuria Hemorrhage after surgery	Normal platelet count Prolonged bleeding time Normal clot retraction Normal prothrombin time Prolonged partial thromboplastin time Normal fibrinogen level Normal factor VIII level Normal factor IX level Low factor XI level	Factor VIII deficiency Factor IX deficiency Factor X deficiency Factor XI deficiency Factor XII deficiency	Replacement therapy with Factor XI concentrate Desmopressin (DDAVP) Antifibrinolytics (e.g., tranexamsic acid)	Good with replacement therapy
Acquired Hemophilia C (Factor XI inhibitor)	Onset in adulthood Prolonged bleeding time Spontaneous bleeding Hematuria Hemorrhage after surgery	Normal platelet count Prolonged bleeding time Normal clot retraction Normal prothrombin time Prolonged partial thromboplastin time Normal fibrinogen level Low factor XI level Positive factor XI inhibitor titer	Factor VIII deficiency Factor IX deficiency Factor X deficiency Factor XI deficiency Factor XII deficiency Factor XIII deficiency Factor VII deficiency Factor VI deficiency Factor V deficiency Factor IV deficiency Factor III deficiency Factor II deficiency Factor I deficiency	Replacement therapy with Factor XI concentrate Desmopressin (DDAVP) Antifibrinolytics (e.g., tranexamsic acid)	Good with replacement therapy
Congenital Hemophilia D (Factor XII deficiency)	Onset in infancy Prolonged bleeding time Spontaneous bleeding Hematuria Hemorrhage after surgery	Normal platelet count Prolonged bleeding time Normal clot retraction Normal prothrombin time Prolonged partial thromboplastin time Normal fibrinogen level Normal factor VIII level Normal factor IX level Normal factor XI level Low factor XII level	Factor VIII deficiency Factor IX deficiency Factor X deficiency Factor XI deficiency Factor XII deficiency	Replacement therapy with Factor XII concentrate Desmopressin (DDAVP) Antifibrinolytics (e.g., tranexamsic acid)	Good with replacement therapy
Acquired Hemophilia D (Factor XII inhibitor)	Onset in adulthood Prolonged bleeding time Spontaneous bleeding Hematuria Hemorrhage after surgery	Normal platelet count Prolonged bleeding time Normal clot retraction Normal prothrombin time Prolonged partial thromboplastin time Normal fibrinogen level Low factor XII level Positive factor XII inhibitor titer	Factor VIII deficiency Factor IX deficiency Factor X deficiency Factor XI deficiency Factor XII deficiency Factor XIII deficiency Factor VII deficiency Factor VI deficiency Factor V deficiency Factor IV deficiency Factor III deficiency Factor II deficiency Factor I deficiency	Replacement therapy with Factor XII concentrate Desmopressin (DDAVP) Antifibrinolytics (e.g., tranexamsic acid)	Good with replacement therapy

Treatment.A Prevent From Sources that Aggravate Bleeding (Tocantins)

- 1 Limit activities Advise occupations sports or other activities which involve minimal physical hazards
- 2 Prevent areas of body which are subject to injury
 - a Lubricate postiles and other superficial bleeding sites with petroleum to prevent drying and cracking of scabs
 - b Apply protective bandages splint or casts to existing wounds to prevent repeated hemorrhages
 - c Bandage lower extremities carefully to supply support to surface skin vessels which are indicated
- 3 Surgical procedures Limit the number and extent of operative procedures to a minimum
 - a Considered for elective surgery carefully
 - b Minimize trauma extent and duration of operative procedures
 - c Perform operative procedures in stages (e.g. extract one tooth or remove one tonsil at a time)
 - d Prepare patient for surgical procedure by appropriate hemostatic technique (e.g. preoperative fresh whole blood transfusion or vitamin K)
- 4 Correct intrinsic factors
 - a Treat cardiac failure or hypertension when present
 - b Correct symptoms of violent coughing or sneezing

B Local Bleeding Must Be Treated Promptly

- 1 Bandaging properly used especially for hemostasis
 - 2 Topical thrombolytic may be applied locally for hemostasis
 - 3 Thrombolytic less effective than thrombin
 - 4 Adhesive Absorbent Bandage USP (Gelfoam®) is useful for minor bleeding
 - 5 Electrocoagulation
 - 6 Chemical cautery Use ally of silver only for small bleeding sites e.g. pistil (see page 11) Use triethyl aluminum chloride or chromic acid
 - 7 Snake venom (RasulVip) 1:10,000
- C General Management of Bleeding Must be treated by measures which combat hemorrhage
- 1 Combat hemorrhage (see page 27) Fresh whole blood (not older than 3-4 hours) is preferred because of its hemostatic as well as anti-hemolytic and anemic effect Plasma may be used when whole blood not available
 - 2 Control bleeding
 - a Blood clotting factors
 - (1) Fresh whole blood transfusion IV (see page 27 under Shock) Thrombolytic is not refrigerated whole blood clot is at least largely within 12 hours of the time of preparation. It is not necessary to administer red blood cells separately in all forms of hemorrhage regardless of cause
 - (2) Plasma transfusion Transfusion of fresh frozen plasma (not older than 10 days) provides prothrombin

fibrinogen and hemophilic globulin and certain other factors which may be of value in controlling bleeding. There are no platelets in plasma.

- (3) Antihemophilic Globulin U S P (Cohn Fraction I) in average doses of 200 mg (sometimes up to 600 mg may be required) in 5-10 cc physiological saline causes a decrease in the spontaneous clotting time of the blood of hemophilic patients.

h Vitamins

- (1) Ascorbic Acid U S P See page 441
 (2) Phytonadone U S P (vit K₁ emulsion M phyto 8) For use in acute hemorrhagic emergency due to hypoprothrombinemia. Give 50-100 mg I V very slowly.
 (3) Vitamin E and related compounds. Experimentally this group of agents has been reported to increase the capillary resistance in certain diseases which may be treated but clinical studies have been discouraging. Two preparations are Rutin N F 20-50 mg q i d and hydroperidine methyl chalc 50 mg q i d.

- c Corticotropin (ACTH) and the steroids (see page 423) may produce striking remissions of the purpuric hemorrhagic reaction (increased red cell count and platelets and decreased bleeding tendency) and at least tide the patient over until a chance time as other more specific measures (e.g. transfusions, surgery) can be safely instituted.

- d Antiheparin agents. In anaphylactoid shock secondary thrombopenic purpura, irradiation reaction, netter's mustard therapy, leukemia menorrhagia and in certain other conditions heparin or a heparin-like substance is liberated in excess and appears to be responsible for a bleeding tendency (hyperheparinemia). The excess of heparin may at times be counteracted by the use of two agents, protamine sulfate or toluidine blue which inactivate heparin by forming a chemical complex.

- (1) Protamine Sulfate Injection N F 30 mg in 5 cc aqueous solution I M every 4-8 hours until patient has ceased to pour 150 mg or 250-500 mg of 5% gluccose solution may be given slowly I V is often given at the time of the final I M injection. Protamine treatment (see J A M A 139:1251, 1949) may provide a diagnosis if cause of the trouble.

- (2) Toluidine blue 6-8 mg /Kg body weight dissolved in normal saline given slowly I V (over a 2 hour period) daily for 3 days and followed by 2-4 mg /Kg for 3 additional days. In preparation of the dye solution it must be passed through a Searle filter for filtration and removal of large dye particles. Transient nausea and vomiting bluish tint to skin and blue coloration of urine and feces may be encountered.

- e Splenectomy. Removal of the spleen may be indicated in selected cases of primary thrombocytopenic purpura and in cases of secondary thrombocytopenia due to certain splenic diseases (hypersplenism). Demonstration of megakaryocytic activity by the bone marrow is essential to the proper evaluation of the individual. In general

spl. nectomy is advised only in the "hypersplenic" forms of th. embocytopenic purpura (primary or secondary i.e. Guch, Banti's and granulomatous diseases of the spleen) but the operation may be indicated in very selected cases of bone marrow megakaryocyte deficiency. The decision as to need for splenectomy should be made by a trained hematologist.

Rh FACTOR

(Reaction due to Blood Transfusion code No 010 38x)

When blood containing the Rh factor (from Rh positive donor) is introduced into a person without the factor (Rh negative) the Rh factor acts as an antigen and agglutinins may develop against it (anti Rh agglutinins). After the agglutinins have developed Rh positive blood transfusion is no longer suitable for transfusion. purpura the agglutination and hemolysis of the donor cells is likely to occur. The severity of such transfusion reaction (as with intergroup reactions) may vary considerably. Rh sensitization is known to develop by multiple pregnancies in Rh negative women with Rh positive husbands.

Precautions

A. General Rules

- 1 All blood for transfusions should be Rh typed in addition to conventional intergroup typing and then cross matched with recipient blood.
- 2 Rh positive individuals may safely receive blood only from Rh positive donors.
- 3 Rh negative individuals may safely receive blood only from Rh negative donors.

B. Specific Rules Never give Rh-positive blood to any of the following

- 1 Rh negative individuals who have had previous transfusions
- 2 Rh negative women who have had multiple pregnancies by Rh positive husbands
- 3 Rh negative pregnant women
- 4 Infants with erythroblastosis

Remarks

See under transfusion reactions on page 249

BLOOD TRANSFUSION

Physiological Reaction

Blood is given in order to

- 1 In case of circulating fluid volume
- 2 In case of oxygen carrying capacity of blood
- 3 In case of protein concentration
- 4 In case of regulability of blood
- 5 In case of immune bodies

Contraindications

Transfusions must be given carefully in cases of acute pulmonary edema, cardiac failure, nephritis, and pulmonary embolism or infarction.

Preparation for Blood TransfusionsA. Typing and Cross matching

1. Determine blood type of recipient. Use known typing sera: Anti A Blood Grouping Serum (USP) (or serum from Type B blood) and Anti B Blood Grouping Serum (USP) (or serum from Type A blood). Blood type may be determined according to chart below.

Recipient's rbc		Recipient's Type	
Anti A Serum	Anti B Serum	Landsteiner	Moss
+ Agglutination	+ Agglutination	AB	I
+ Agglutination	- Agglutination	A	II
- Agglutination	+ Agglutination	B	III
- Agglutination	- Agglutination	O	IV

2. Donor should always be of the same blood type as recipient. Cross match as indicated below. In emergency situations, Type O (Moss IV) blood (universal donor) may be administered to any type. Type AB individuals may receive blood of any type (universal recipient).
3. Always perform direct compatibility test between donor and recipient blood before each transfusion, even if the blood came from a previously compatible donor. This is done by mixing recipient's cells (RC) and donor's serum (DS) on one side of a glass slide, and donor's cells (DC) and recipient's serum (RS) on the other side.

Donor's cells
+
Recipient's serum



Recipient's cells
+
Donor's serum

The slide is rocked back and forth for 5 minutes and examined with the low power microscope. If there is any agglutination or suggestion of hemolysis, a new donor must be found.

4. Whenever possible, determine the Rh of the recipient. Rh negative recipients should receive only Rh negative blood. Rh positive recipients may receive Rh positive or Rh negative blood in emergency when no compatible Rh positive blood is available.

B. Disease Which May Be Transmitted By Blood Transfusion

1. Syphilis. Donor should always have a serological test for syphilis.
2. Malaria and hepatitis. Blood from a person with a history of malaria or infectious or homologous serum hepatitis should not be used.

Technic of Blood Transfusion

There are two methods for administration of blood (1) indirect transfusion using modified blood (blood to which anticoagulants have been added) and (2) direct transfusion (blood transfused directly by vein without addition of any substance). The first method is now used almost exclusively.

A Indirect Transfusion Using Modified Blood Citrate is used most frequently as the anticoagulant.

1 Collection of blood. A specially prepared vacuum flask that contains sodium citrate—citric acid in dextrose solution is commonly used to collect 500 cc (1 pt.) of blood. The collection apparatus is equipped with a valve that allows the amount of suction to be regulated. This is the technique used in most blood banks.

2 Administration. The collecting bottle is connected with a Y tube to a small bottle of saline. The blood bottle is clamped off at one arm of the Y. The saline is then used to fill the tubing and start the infusion. After the saline has begun to flow into the vein, the blood bottle is allowed to flow and the saline topcock is closed off the arm of the Y tube.

B Direct Transfusion This technique uses an apparatus consisting of a large syringe and a smooth working 3-way stopcock. The blood is drawn into the syringe from the donor through stopcock turned and the blood injected immediately into recipient.

Precautions in Administration

A Always administer alkali (5 Gm. or 75 gr. sodium bicarbonate) orally 250 cc ($\frac{1}{2}$ pt.) M/6 sodium lactate before beginning transfusion. Prophylaxis for hemolytic reaction.

B Never warm blood before administration.

C Age at least 40: 50 drops per minute = 150 cc (5 oz.) per hour. Can be given at maximum rate of 1 (15%) per cent.

D In case of any cardiac insufficiency give about 1 cc (15%) per minute (12.5 drops per minute). Never give over 75 (2½ oz.) in 1 hour. Except in the most difficult cases.

COMPLICATIONS OF TRANSFUSION

Transfusion Reaction

Transfusion should be stopped immediately if patient complains of chills, general shivering, nausea, vomiting, anxiety, pruritus, oppression, pain in back of neck, thorax and lumbar area, or a sense of fullness of the head.

A Hemolytic Reaction Most severe of all and may be fatal. Symptoms in the donor usually appear during the transfusion immediately afterward. Hemolytic reactions almost always caused by incompatibility of blood.

B Allergic Reaction Usually occurs following transfusion.

1 Mild form. Urticaria, general edema and synophyllia.

2 Moderate form. Difficulty of breathing, a feeling that the throat is closing, cyanosis, dyspnea, etc.

C Chills and Rigors (Pyrexia). Most common reactions. Occur usually within 15 minutes to 1 hour after transfusion. Characterized by chills, rigors, followed by fever.

Treatment of Transfusion Reactions

A Hemolytic Reactions

- 1 Rationale To attempt to prevent the precipitation of acid hematin in the renal tubules. Therefore alkalinization of urine and forcing of fluids is important.
- 2 Definitive measures
 - a Give 10 Gm (150 gr) sodium bicarbonate orally at once and every 4 hours. If patient is unable to void 10-20 Gm (150-300 gr) sodium bicarbonate (specially prepared see pag 15) in 100 cc of distilled water i.v. or 500-1000 cc (1-2 pt) of M/6 sodium lactate i.v. Repeat the dose in 8 hours or sooner if the urine becomes acid.
 - b Collect all urines and examine for hemoglobin. Continue alkalinization until no further hemoglobin is present.
 - c Supply fluids orally or by parenteral means to maintain urine volume of at least 1500 cc (1 1/2 qt) per 24 hours as long as renal function is normal. (See acute renal failure page 303)
 - d In severe or repeated hemolytic reactions where repeated transfusions may be necessary corticotropin (ACTH) or one of the steroids is indicated (see page 423)

B Allergic Reactions Treat as an allergic reaction

- 1 Give 0.2-0.5 cc (3-8 mg) of epinephrine (adrenaline) 1:1000 subcut. at once.
- 2 If symptoms persist may try antihistamines (see page 45)

C Chills and Reactions

- 1 During chill keep patient warm by adding blankets and hot water bottles. This is usually all that is required.
- 2 However since the differential diagnosis from the allergic reaction is often impossible give epinephrine (adrenaline) 1:1000 0.2-0.5 cc (3-8 mg) subcut. as soon as possible.

Chapter 10

DISEASES OF THE GASTROINTESTINAL SYSTEM

NONSPECIFIC GASTROINTESTINAL SYMPTOMS

HALITOSIS (Bad Breath) (code No 619)

Halitosis can result from many causes and treatment is directed at removal or correction of the cause

Testment

A C er ect bn malit ca of oral hygiene if present

B T e t E i s t i n g D i s

- 1 Chron nas l and i us dise e
- 2 Dent ic i s gum i f e t i o n s t a s i l l a i n f e c t i o n e t
- 3 Sy tem d i s e a s e s f e v e r a n d t o m i a s
- 4 Chronic pulmonary di e e g lung abscess
- 5 I n t r i n s i c d i s e a s e s a t a n y l l o f t h e G I t r a c t
- 6 Neu psy h i a t r i c d i s o r d e r s w h e r e o n l y t h e s u b j e c t i v e c o m p l a i n t i s " b a d b r e a t h " p e r s e n t

C E l m i t e O f f d i n g f o d s F r o m t h D i s

- 1 Q u a r a n d s
- 2 R i c h o r g a s t r o i n t e s t i n a l d i s e a s e s i f t h e y a r e t h e k n o w n c a u s e s

HEARTBURN (Pyrosis) (code No 7843)

Rule type if usual Consider especially disease of lower oesophagus if mild biliousity at

Treatment

A D r u g s

- 1 A n t i a c i d s These drugs (page 264) are often effective in relieving oesophageal discomfort although it is not felt that they are of benefit in direct relation to the neutralization of the gastric hydrochloric acid
- 2 S a l a c i n e Anti-peptic medication (see page 265)

B E l i d D i (See page 54)

NAUSEA AND VOMITING (Nausea code No 611) (Vomiting code No 614)

These symptoms may usually occur acutely and may be

due to a wide variety of psychia. reflex or central causes

A Psychic Causes These are variable and may have either superficial or deep seated basis

B Reflex Causes Disturbances of various gastrointestinal structures and oth. viscera are capable of exciting the vomiting center. Correction of this type of vomiting is therefore dependent upon removal or alteration of these reflex disturbances

- 1 Irritation inflammation or mechanical disturbances at any level of gastrointestinal tract (from pharynx to rectum)
- 2 Irritating impulses arising in any diseased viscera e.g. chol. cystitis
- 3 Disturbances of semi circular canals e.g. seasickness
- 4 Toxic action of cardiac drugs e.g. digitalis

C Central (Vomiting Center) Causes

- 1 Central injection Emetine apomorphine morphine
- 2 Exogenous and endogenous toxins
- 3 Increased intracranial pressure
- 4 Cerebral hypoxia Cerebral anemia or hemorrhage

Treatment

A Acute Simple acute vomiting such as occurs following dietary indiscretion or as experienced in the morning sickness of early pregnancy may require little or no treatment. When necessary treatment consists of prescribing simple tolerated foods and occasionally mild sedative and antispasmodic drugs

B Prolonged Severe or prolonged nausea and vomiting requires careful medical management. Specific causes must be corrected or eliminated. The following general measures may be utilized as adjuncts to specific medical or surgical measures

- 1 **Fluid and Nutrition** Maintain hydration and nutrition. Withhold foods by mouth temporarily. Administer 5-10% glucose in saline or water I.V. in quantity sufficient to maintain adequate hydration. When oral feedings are resumed commence with dry foods in small quantities e.g. salted crackers Graham crackers etc. With morning sickness these foods may best be taken before arising. Later change to frequent small feedings of simple palatable foods. Hot beverages and clear broths and cold beverages iced tea and carbonated liquids (especially ginger ale) are tolerated quite easily. Avoid lukewarm beverages. Always consider patient's food preferences.

Drugs

a Sedative antispasmodic drugs may be of value (see page 266)

b Ethyl aminobenzoate (Benzocaine) 0.2 Gm (3 gr) with phenobarbital 20 mg ($\frac{1}{2}$ gr) every 8 hours p.r.n.

c **Chlorpromazine** Hydrochloride U.S.P. (Thorazine®) has been used for control of nausea and vomiting due to a wide variety of causes. It is administered orally in doses of 25-50 mg every 4-6 hours p.r.n. or orally in doses of 10-50 mg every 4-6 hours p.r. (see p. 40)

d Prochlorperazine N.N.D. (Compazine®) 5 mg i.i.d. q.i.d. orally when feasible or 5-10 mg (1-2 cc) deep into buttocks every 3-6 hours (not exceeding 40 mg/24 hours) has been reported to be valuable.

e Mech line Hydrochloride N N ■ (Benamine®) 25 mg
 daily may be of value in moderate cases

3 Psychotherapy

- a ■ Latency of patient is recommended Hospitalization ■
 ■ necessary Visiting should be restricted
- Avoid unpleasant psychological stimuli such as strange odors
 foul smelling or foul looking medication emesis bins
 or other unattractive objects as well as foods which are
 improperly prepared or served
- Place patient on a definite treatment program and let it
 be known that something is being done Hard boiled
 or brutal techniques are to be avoided
- d Attempt to determine the psychodynamics of the illness
 and vomiting but avoid aggressive psychotherapy during
 acute phases of the illness

HICCUP (Singultus) (code No 671)

Hiccup although a common and usually benign symptom may
 be a manifestation of any one of many diseases It is important to
 rule out a wide variety of specific causes such as CNS dis-
 ordered pulmonary disorders gastrointestinal disorders
 alfabur infectious diseases and others

Treatment

Treatment of the specific cause may suffice to relieve hiccup
 However this is usually necessary to use certain specific
 measures to relieve the hiccup symptom Counting
 have been suggested for breaking up the rhythmic reflex All the
 treatment measures may fail and the symptom may be prolonged
 and severe as to jeopardize the patient's life

A Simpl H m R m d These measures probably assist by di-
 verting the patient's attention away from the distressing on-
 set of the hiccup painful unpleasant stimuli or frightening
 patient from possibly unpleasant or embarrassing (holding
 breath,屏气; waiting, 等待; hiccuping, 打嗝)

B D g and M d c t i o n

- 1 Sedation Any of the usual oral sedatives may be used
 eff 1 v Gl P t b bital Sodium USP Pe tobarb
 t n S d m B P 0 1 Gm (1½ gr) orally 0 13 Gm
 (2 gr) by rectal proctitis
- 2 Anesthesia Local anesthetic agents such as cocaine may be
 applied to the alveolar mucosa and also to the pharynx
 G l t h a m y b t d i t a t b l s
- 3 Atropine Atropine 1 mg USP BP 0 3 0 6
 mg (1/60 1/100 g) may be given subcutaneously
- 4 Anxiolysis may be effective
- 5 Carbon dioxide Hyperventilation with 20% carbon dioxide
 by face mask for 3 to 5 minutes administration 10 15% CO mixt e
 by face mask for 3 to 5 minutes
- 6 Chlorpromazine Hydrochloride USP (Thorazine®) has
 been fully evaluated for prolonged hiccup
 (page 252)

Surgical Measures Various pharyngeal operations including
 glossectomy may be indicated in certain cases

cases which fail to respond to all other measures and which are considered to be a threat to life

CONSTIPATION (code No 630)

Eliminate specific causes of constipation first. Rule out colonic or rectal lesions, hypometabolism or psychogenic causes. Be especially suspicious of specific causes when there is a sudden unexplained change in bowel habits. Inadequate fluids and low residue diets may have a constipating effect. The following commonly used drugs which the patient may be receiving for an unrelated illness may cause constipation: belladonna and derivative, narcotic drugs, bismuth salts, calcium salts, aluminum hydroxide gels (Amphogel®), aluminum phosphate gels (Phosphalge®) and iron salts.

Treatment

A Correct Patient Attitude Toward Elimination

1. A daily bowel movement is not essential to normal health or well being. There is normally considerable individual variation in the frequency of bowel movements.
2. So called auto intoxication theories are unfounded.
3. Constipation particularly for short periods is seldom a cause for alarm.
4. Many symptoms (e.g., lack of pep) attributed to constipation have no such relationship.
5. Periodic purgation serves no tonic purpose.

B Re-establishment of Regular Evacuation

1. The gastro-colic reflex should be utilized to optimal advantage by having patient set aside a regular daily period after a meal (preferably breakfast) for a bowel movement, even when the urge to defecate is not present. This is based physiologically on the primitive reflex wherein distention of the stomach by food sets off a reflex evacuation of the colon. Explanation of the reflex vacuum as it occurs in infants after feedings appeals to many patients. Emphasize the fact that the normal reflex is preserved or lost by personal habits or social customs.
2. Sufficient time must be allotted to permit a leisurely performance of the act.
 - a. Patient may alter his daily schedule to permit more time for bowel movements.
 - b. Relaxation may be aided by reading a book, etc. while sitting on the toilet.
3. Cathartics and enemas should never be employed without direct advice or supervision of a physician if patient ever expects seriously to correct his constipation, since these measures interfere with the normal bowel reflexes. For psychological reasons. If not physiological, it is sometimes inadvisable to discontinue such measures suddenly if patient has employed them for a prolonged period of time. It may be better to compromise temporarily with intermittent measures of bland laxatives and mild enemas (see next page). Chronic cathartic and enema addicts often defy all medical measures and their treatment is particularly hopeless when

there are serious underlying psychiatric disturbances

C Diet In general the diet may be profitably modified to satisfy the following requirements (see pag 54)

- 1 Adequate volume Often constipation is merely due to inadequate food intake
- 2 Adequate bulk of residue This does not necessarily imply roughage such as bran Smooth or bland foods may be preferred in spastic constipation
- 3 Vegetable irritants Unless there is specific contraindication (e.g. intolerance) of green or raw fruits & vegetables may be of value in many cases of chronic constipation especially the cold atonic type
- 4 Adequate fluids The patient should be encouraged to drink adequate or large quantities of fluids both in reas & water available in the intestinal tract for passage of intestinal contents

a Six to 8 glasses of fluid per day in addition to fluid content of food as ordinarily sufficient

b The time honored glass of hot water taken a half hour before breakfast seems to exert a mild laxative effect

D Exercise Moderate physical exercise adjusted to individual needs and capabilities is essential Bed patient may profit by active and passive exercises Good tone of the external abdominal muscles is important Corrective physiotherapy may be employed in patients with ptotic abdomens

E Laxatives

- 1 Bland laxatives These agents should be employed temporarily during the bowel training (re-education) program or as a compromise measure in long standing cathartic and enemata addicts They are never intended as a substitute for a careful bowel training program They should be withdrawn as soon as the constipation improves

a Liquid Paraffin U.S.P. Liquid Paraffin M.M. (mineral oil) 15-30 cc (1/2-1) T 2 times daily per os

b Agar U.S.P. M.P. with mineral oil 15-30 cc (1/2-1 oz) 1-2 times daily per os

Do not use mineral oil over prolonged periods in combination with absorption of foodstuffs particularly fat soluble vitamins There is also some risk of lipid pneumonia even from its oral use

Olive Oil, U.S.P. B.P. 15-30 cc (1/2-1 oz) 1-2 times daily per os

d Vegetable mucilage g Psyllium Hydrophil Muciloid H.H.D. (Metamucil®) 1-3 tsp b.d. to t.q. per os in full glass of water

Caseinase G.D. Aomti Fluid Ext. : U.S.P. 4 g c (1-2 d) h.s. very light

f Magnesia Magna U.S.P. (milk of magnesia) 15-30 (1/2-1) h.v. y night

g Sodium Phosphate U.S.P. M.P. (disodium phosphate) 4-8 Gm (1-2 d) in hot water before bedtime

h Docusyl Sodium Sulfinate U.S.P. (Cela® D) 1-2 capsules 3 times a day with meals in case of chronic constipation

F Enemas Enemas interfere with restoration of normal bowel reflex. These measures (as with above medications) should be utilized only as temporary means in chronic constipation or fecal impaction. They may be necessary for cleansing a bowel preparatory to diagnostic studies or proctologists.

- 1 Saline enema (non irritating) Warm physiological saline solution 500 2000 cc (1 pint to 2 quarts) p r n
- 2 Warm tap water (irritating) 500 1000 cc (1 pint to 1 quart) p r n
- 3 Soapsuds (S S) enema (irritating) 150 cc (3 oz) of soap solution in 1860 cc (62 oz) water
- 4 Oil retent enema 180 cc (6 oz) of mineral oil or vegetable oil instilled in rectum in the evening and retained overnight. A cleansing soapsuds enema is given the following morning.

FECAL IMPACTION (code No 660 616)

This condition should be suspected in all severely constipated patients especially bed patients. Appropriate anticonstipation measures (see p 254) will usually prevent impaction.

Treatment

- A Manual removal of fecal impaction
- B Oil retention enema followed by cleansing enemas p r n (see above). Manual removal of impaction may be facilitated by this procedure.

FLATULENCE

Eliminate apathetic state of flatulence Gastrointestinal gas is in large part due to swallowed air (aerophagia). However flatulence may be due to dietary causes and fermentation and organic disease of the digestive system.

Treatment

- A Correction of Aerophagia Anxiety states are often associated with deep breathing and sighing and the consequent swallowing of considerable quantities of air. When possible treat underlying anxiety features. A convenient and simple method for relieving the distention flatulence and belching during acute anxiety states with severe aerophagia is to have the patient place a small cork between his teeth while he swallows. This prevents air swallowing.
- B Correction of Physical Defects These sometimes interfere with normal swallowing and/or breathing.
 - 1 Structural deformities of the nose and nasopharynx e.g. nasal obstruction and adenoids
 - 2 Structural deformities of the teeth. Special diet.
- C Good Hygiene and Eating Habit Instruct the patient to

- 1 Avoid eating too rapidly and too much
- 2 Avoid eating while under emotional strain
- 3 Avoid taking laxatives
- 4 Avoid chewing gum
- 5 Avoid dietary indiscretions

Diet

- 1 The diet should be composed of bland, high protein, low fat, low carbohydrate foods (see page 54)
- 2 Restrict gas-producing or irritating foods -
 - a Avoid most raw fruits and vegetables especially cabbage, cucumbers, onion, peppers, celery, tomatoes and beans
 - b Avoid sugar in large quantities or concentrated forms
 - c Avoid fried food
 - d Avoid nuts, raisins, berries and other seedy fruits
 - e Avoid pices
 - f Avoid alcohol and a boisterous beverage

Medication These agents are of no therapeutic value and return a only of placebo value

- 1 Antispasmodic drugs (see page 266) are perhaps the most useful of the medications. Besides their antispasmodic effect they serve to diminish the flow of saliva (which is often excessive in the catarrhes) thereby reducing the anaphagia which accompanies the swallowing of the excessive quantity of saliva
- 2 Solutio Pepperminti U.S.P. R.F. 0.5 (1 1/2 min.) t.i.d. in a small glass of water p.c.
- 3 Nostigmine Bromide U.S.P. R.F. (Pantigmin Bromide®) 15 mg (1/4 gr.) t.i.d. p.
- 4 Dehydrocholic Acid U.S.P. (Decholin®) 25 0 50 Gm (3/8 3/4 gr.) t.i.d. p.c.
- 5 Ox bile Extract N.F. (bile salt) 0.3 Gm (5 gr.) t.i.d. p.
- 6 Adobromite Kaolin N.F. B.P. and charcoal emulsion without any physiological justification when one considers the quantities of gas to be reduced as compared with the quantity of the drug to be given

DIARRHEA (code No. 635)Etiology

Attempt to determine the etiology of an individual case when possible. The usual causes may be classified as follows:

- 1 Psychological disorders Nervous diarrhea
- 2 Gastrointestinal Achlorhydria
- 3 Intestinal
 - a Infectious Viral, bacterial, amebiasis
 - b Endogenous Heavy metal poisoning
 - c Drug Cathartics habitually
 - d Structural Gastrointestinal
 - e Neoplastic of the Colon
 - f Idiopathic Chronic ulcerative colitis
- 4 Nutritional deficiency Scurvy
- 5 Primary diabetes Pancreatic insufficiency
- 6 Primary intestinal Chlostridium dysenteriae

- 7 Reflex from other viscera Pelvic pathology (extrinsic to GI tract)
- 8 Neurologic disease Tabes dorsalis
- 9 Metabolic disease Hyperthyroidism

Treatment

- A Eliminate the specific cause, whenever possible
- B Correct Physiologic Change Induced by Diarrhea In addition to necessity for control of intestinal hyperperistalsis it is essential that the following secondary or complicating features be treated
 - 1 Fluid imbalance (dehydration) (see page 7)
 - 2 Mineral imbalance e.g. hypocalcemia (see page 380)
 - 3 Nutritional disturbances e.g. hypoproteinemia (see page 58) and deficiencies (see pages 60-64)
 - 4 Psychogenic disturbances e.g. fixation on GI tract or anxiety regarding sphincter mishaps in cases of long standing diarrhea

C Diet

- 1 Non irritant foods Many clinicians feel that food should be withheld or that the intake during the first 24 hours should be restricted to liquid foods. (See bacillary dysentery page 278) During the acute phase of enteritis the only foods which should be taken by mouth are the following: very bland items: water, weak tea, rice or barley gruel, meat broth, precooked cereals, toast, butter and soda crackers with butter and soft cooked (not fried) eggs. The food is usually administered in about that same order at first.
- 2 Bland foods (never highly spiced or seasoned) These foods should be incorporated in the diets of patients convalescing from acute diarrhea or with chronic diarrhea. They include in addition to the non-irritant food the following items: cereals with milk, cream, and broths and soup, bland cheeses, fish, fruit and meat (not fried), potatoes (not fried), breads, milk products, eggs and food beverages (not carbonated).
- 3 Avoid Vegetables and fruits (especially raw), fried foods, bran, whole grain cereals, jams, jellies, preserves, syrups and candies, pickles, relishes and spices, coffee, carbonated and alcoholic beverages.
- 4 Supplementary vitamins The bland diet is a restricted diet and may further decrease the vitamin deficiency induced by altered intestinal absorption. Patients with chronic diarrhea should probably receive vitamin in dosage comparable to those used for chronic vitamin deficiency states. Roughly this amount may vary from 4 to 10 times the normal maintenance dose (see page 58).

D Anti diarrheal Agents

- 1 Bismuth preparations These may be used for both acute or chronic diarrheas
 - a Bismuth Subcarbonate U.S.P. B.P. 12 Gm (15-30 gr) after liquid bowel movement or q.i.d.
 - b Bismuth Magma N.F. (bismuth hydrate and sodium boro-nate) 4 cc (1 t.p.) after liquid bowel movement or q.i.d.

c $\frac{R}{2}$ Bismuth subcarbonate 15 30 0 $\frac{1}{2}$ ss 1

Camphorated tincture of
opium (paregoric) q s ad 120 0 $\frac{1}{2}$ iv
Shake well

Sig 4 cc (1 tsp) after liquid bowel movements or q 1 d

d Milk of bismuth and par g ic (equal amounts of each)
may b substituted for the above mixture using th same
do e

e $\frac{R}{2}$ B iladonna extract 0 5 gr viias

Bismuth sub carbonate

Calcium lactate

Kaolin

SS 30 0 3i

Peppermint oil

3 drops gtt ii

Sig 4 cc (1 tsp) t i d a c and h s or after liquid
bow l mov emen ts p r n (modified aft Bockus)

2 P ctin kaolin compounds Th se are availabl and are use
ful mixtures Do e 15 30 cc ($\frac{1}{2}$ 1 oz) t i d a c and
h s or after liquid bowel movem ts p r n

3 Albumin tannet This drug has been recomen ded as an
adjunct to other m sures when dis charges are profus
Does 2 Qm (30 gr) t i d a c and h s = after liquid
bowel mov emen ts p r n

4 Op i tes Op iates must be av ided in chronic diarrhea and
ar pr fer bly v ided in acute dia hes unless th r i in
tractable diar hes vomiting and colic Alway x lud th
p sibility of acute surgi al abdominal di s e befor ad
mini tering op i te

a Campho rated Opium Tincture U S P 2 P (paregoric)
(NOT Opium Tinctu e U S P) 4 8 (1 2 dr) after
liq id movem ts p r n o with bismuth (se above)

b Cod ine Ph ph : U S P 15 65 mg ($\frac{1}{4}$ 1 gr)
a b ut after l iquid b wel mo emen ts p r n

5 St ong op i tes Morphine and dihydrom rphin n h uld b
r s v d fo e l cied p t nts with ut e e di r h a
who fault po d to m re o s rv ti m ures

a M rphin 8 late U S P 8 15 mg ($\frac{1}{8}$ $\frac{1}{4}$ gr) sub t
aft r liq id bowel movem nts p n Thi drug may
e od nau ea and v miting

b Dihyd omorphin Hyd m id U S P (Dil v ided)
M y b wh ut ted for m rphin if th und i abl d
ffect of morphin a e to be avoid d M 2 3 mg
($\frac{1}{32}$ $\frac{1}{20}$ g) I M aft l iquid bow l mov m nt p r n

6 Antispasmodic and s dativ d ug (e pag 266) The anti
pa modic dr g parti ularly wh n n d in combin tion with
th barbi t at e xert a favorable and mild antipe list iti
t on It m y be n ary at tim to administer the v
lou b iladonna b iladonna lik kaoloid e a p int of
t i lity in o d r t a biev th d ir d ff ct Antisp
modi s d ti d g may be consid red the ag nts of ch e
in th t t m t of hroni diarrh a ocist d with anxiety
t n ion t t s

7 Dig stant dr g Hydro chloric id panc e tin, and bil
salt at tim e gi d finite non p if relief Wh n there
i demon t abl d ff i ncy of th e ubetanc s repla em t
th apy is mo triking (S sp bil diarrh a s)

Treatment

There is no satisfactory treatment for carcinomas of the esophagus

- A Diet Soft or liquid food should be given as tolerated gastric tonics may be given in selected cases
- B Surgical Removal This is reserved for the few who have no demonstrable metastases and are good surgical risks
- C Deep Radiation Therapy This may be employed in selected cases when surgery is not feasible
- D Morphine sulfate or other suitable analgesic agents should be administered as necessary for relief of chronic pain, especially in terminal cases (see page 33)

CARDIOSPASM (code No 641)

Spasm of the lower end of the esophagus may be due to local or reflex causes. Dysphagia, epigastric pain, and regurgitation of undigested foods are the most common findings. X rays reveal dilatation above the site of obstruction.

Treatment

- A Soft or liquid food as tolerated
- B Anticholinergic drugs have been employed with variable and non-spectacular results. Large doses of parenteral antispasmodics are often ineffective. Recent experiments and clinical studies suggest that the sympatholytic agents may be effective (see page 266)
- E Mechanical dilatation of the cardia by graduated bougies may be necessary

DISEASES OF THE STOMACH AND DUODENUM

PEPTIC ULCER

(Gastric : code No 640 951) (Duodenal : code No 651 951)

An acute or chronic ulceration of any portion of the GI tract which may be exposed to the action of a irritant. Lesions may occur in any point in the lower esophagus, stomach, upper duodenum (most common), gastroenterostomy margins and in certain anomalous areas of the GI tract (e.g. Meckel's diverticulum). The ulceration may be simple or complicated by hemorrhage, perforation, scarring and obstruction of pyloric antrum.

Diagnosis

May be based upon

- A History
 - 1 Pain Classically there is periodic (12 hours) or fasting epigastric discomfort, burning or pain usually relieved by bland food and/or alkalis
 - 2 Other symptoms Nausea, vomiting, flatulence, distention, hematemesis and melena
- B Physical Findings Often local tenderness in the epigastrium

- Laboratory Finding** There may be
- 1 Abundant or excessive free HCl in gastric juice both with and without histamine injection
 - 2 Gross or occult blood in stools
- D X-ray Evidence of Ulceration** Based upon films and fluoroscopy of GI series. Ulcer activity is usually indicated by presence of niche or irregularity of mucosal contour but sometimes evidence is indirect such as altered peristalsis, pylorospasm, gastric retention or persistent deformity. Repeat GI series may be necessary to demonstrate active ulceration in certain cases.
- E Gastric opacification of ulcer crater**

Diagnostic Criteria

- A It is not advisable to make a diagnosis of peptic ulcer unless there is or has been x-ray or gastroscopic evidence of ulcer
- B In face of clear cut peptic ulcer history without laboratory confirmation it may be necessary at times to perform repeated GI series
- C Malignant disease should be suspected when the following findings are present
 - 1 Location The lesion is located in the stomach particularly if in the prepyloric region high on the lesser curvature or if on the greater curvature
 - 2 Duration of symptom is short (no previous symptoms)
 - 3 Age of the patient is more than 40 years
 - 4 Failure of response There is failure of clinical and x-ray response after not less than 3 and not more than 4 weeks of intensive medical therapy (see below)

ACUTE PHASE

Treatment

A General Measure

- 1 Rest (physical and mental) The patient should have 2 or 3 weeks rest from work if possible. If the home situation is unsatisfactory or unpleasant or if cooperation of the patient is unsatisfactory hospitalization is recommended. If patient's finances are limited it may be necessary for him to continue work during treatment. In each case it is essential that he be given careful instructions regarding the carrying out of the medical program under the given working conditions. When possible arrangement should be made for replacing his income and for any other factors which need to be modified in the patient's home or working environment.
- 2 Orientation The patient should be advised as to the chronic current nature as well as to the potentialities of the disease. Do not emphasize cancer as a complication of the disease.
- 3 Psychotherapy Anxiety producing mechanism should be relieved whenever possible. It is not usually wise to institute active psychotherapy during the acute phase of the illness (see page 36).
- 4 Alcohol and tobacco must be avoided.

- 5 Avoidance of certain drugs [e.g. corticotropin (ACTH) and the cortisones] Recrudescence of symptoms and even perforation and hemorrhage may occur in patients with peptic ulcer during the course of administration of corticotropin (ACTH) and the cortisones. This hazard should always be considered. The mechanism is not known.

Diet

- 1 A wide variety of diets are available but the Sippy diets or modifications of these are probably the most effective (see page 54). The patient should learn the principles of his diet and should be taught to be careful of his diet for the remainder of his life. Rich, spicy, hot and coarse particle foods should be excluded from the diet permanently. Regular and frequent high protein meals with proper mental attitude during meals should be emphasized as essential for successful results from diet. The length of time the patient should remain on each phase of the diet will depend on numerous factors, namely:
 - a Severity of symptoms
 - b Treatment situation e.g. Sippy diet does not meet the nutritional requirements of the hard laborer. Additional food is essential.
 - c Intelligence and cooperativeness of the patient
 - d Response to treatment
- 2 Avoid short cuts. In general, most of the short cut or so called modified methods do not ultimately save the patient time. In many cases they not only fail to provide the necessary relief of symptoms but also actually serve to lengthen the period of convalescence. The physiological importance of a strict dietary regimen in the acute phase is of great importance to peptic ulcer patients especially the new patients since these patients will otherwise fail to recognize the importance of diet in the long term care of their disease. Patients on short cut diets become sloppy and lackadaisical and indifferent to the potentially serious nature of their illness. Unfortunately there is no unanimity of opinion among clinicians regarding the matter of diet in peptic ulcer.
- 3 Protein hydrolysate solutions or similar commercial protein preparations may be used to supplement the Sippy diet especially when it is necessary to reduce the fat intake. Boiled cow or milk protein preparation or goat's milk may be substituted in individuals intolerant of cow's milk.
- 4 Retractions. Meat extract, bran, raw vegetables and fruits, fried foods, condiments, spices, alcohol, coffee, tea and carbonated beverages.

Drugs

- 1 Antacids. It is difficult to state which of the many antacids available are most effective since in certain circumstances each of the agents listed below has peculiar advantages. Some clinicians feel that antacids are of little or no value in the well managed patient. In general, when not a suitable dietary regimen is superadded or anticholinergic drugs will either obviate or decrease the need for antacids. All patients on antacid therapy should be watched for

diarrhea constipation alkalosis and fecal impaction

Antacid powders are prescribed on various schedules according to the stage of the diet. During the early stage of the Sippy regimen the powder is given on alternate hours or 4-6 hours during the day and even at night if necessary. The interval between powders may then be lengthened according to clinical and x-ray evidence of improvement. For more prolonged use the powder are usually administered 2 hours p.c. and p.r.n. Magnesium oxide is a laxative drug and calcium carbonate tends to produce constipation.

a Magnesium Oxide U.S.P. B.P. and Calcium Carbonate U.S.P. B.P.

℞ Magnesium oxide 30.00 g. Sig.

Calcium carbonate q.s. ad 120.0 Div.

Sig. Take ½ tsp. in half glass of water as directed.

By varying the magnesium oxide in the above powder the laxative or constipating effects of the 2 ingredients may be effectually balanced. The powder may be given in alternate doses with the aluminum hydroxide gels (see below).

b M. B. Calcium (magnesium bis-muthalium) mixture

℞ Magnesium oxide 30.00 g. 3r. M.

Bismuth subcarbonate 30.0 3r.

Calcium carbonate q.s. ad 120.0 Div.

Sig. ½ tsp. in half glass of water as directed.

The bismuth incorporated because of its soothing coating effect this powder occasionally offends the patient when the magnesium oxide calcium carbonate powder fails to relieve.

Magnesium Trisilicate U.S.P. B.P. ½ tsp. in half glass of water as directed. An excellent non-systemic antacid with unobjectionable properties.

d Aluminum Hydroxide Gel U.S.P. (Amphogel® Creamalin® etc.) The emulsions have recently enjoyed popular use because of convenience of administration rather than for maintenance of alkalinity and because of its adsorbent protective and demulcent action. However they may constipate interfere with phosphate and vitamin absorption may require large doses and occasionally fail to relieve.

(1) Aluminum hydroxide gel liquid 1-2 tsp. in half glass of water very 2-4 hours p.r.n.

(2) Aluminum hydroxide gel (d) tablets chew 1-2 tablets and follow with half glass of water very 2-4 hours p.r.n. The tablets are especially convenient for patients who are finding it difficult to continue work or travel.

(3) Aluminum hydroxide gel magnesium trisilicate mixtures liquid (Gelucil® Tricreamlet® etc.) 1-2 tsp. in half glass of water every 2-4 hours p.r.n. The addition of magnesium trisilicate increases the neutralizing power and protective coating action of the aluminum hydroxide gel. This mixture is also less constipating.

(4) Aluminum hydroxide gel (dried) magnesium trisilicate tablets chew 1 or 2 tablets every 2-4 hours p r n and follow with a half glass of water

- 2 Sedative drugs The use of sedative drugs will depend on the emotional status of the patient. Tense and apprehensive patients will usually profit greatly from proper sedation. Most patients with peptic ulcer profit by sedative drugs. The barbiturates are the preferred sedatives. They may be used alone or in combination with antispasmodic drugs. Hypnotic doses of the barbiturates may be necessary to insure sleep during the acute phase of the ulcer (see page 39)

3 Antispasmodic antilecretory drugs

- a Belladonna preparations when employed in proper doses are probably as effective as any of the many new anticholinergic preparations and have the added advantage of being inexpensive

(1) Belladonna Tincture U S P B P 0.30 cc (5 to 10 drops) in half a glass of water orally t i d 20-30 minutes a c and h s p r n (0.6 cc of the tincture equals about 0.2 mg of atropine). This preparation permits rather delicate titration of desired antispasmodic effect by simply regulating the number of drops

(2) Belladonna Extract U S P B P 8-15 mg ($\frac{1}{8}$ to $\frac{1}{4}$ gr) tablets or capsules orally t i d 20-30 minutes a c and h s p r n (15 mg equals about 0.2 mg atropine alkaloid)

(3) Belladonna tincture 10-30 cc (3i to 8i)
Elixir of phenobarbital q s ad 120 cc (5iv)
Sig 1 t p in half glass of water t i d 20-30 minutes a c and h s p r n

(4) Belladonna extract 8-15 mg (gr $\frac{1}{8}$ to $\frac{1}{4}$)
Phenobarbital 15 mg (gr $\frac{1}{4}$)
Sig 1 tablet t i d 20-30 minutes a c and h s p r n

- b Anticholinergic antispasmodic drugs Many new and effective but relatively expensive agents are available. These drugs as is the case with belladonna are given t i d q i d and should generally be given in doses large enough to produce some oral dryness. Although they are said to be relatively free of side effects it is best to watch for blurred vision difficulty in chewing constipation and urinary retention

(1) Diphenhydramine hydrochloride (Trisentine®) 75 mg ($\frac{1}{4}$ gr)

(2) Methantheline Bromide U S P (Banthin®) 30-100 mg ($\frac{3}{4}$ to $1\frac{1}{2}$ gr)

(3) Propantheline Bromide N N D (Pro-Banthine®) 15-30 mg ($\frac{1}{4}$ to $\frac{1}{2}$ gr)

(4) Oxyphenonium Bromide N N D (Antirnyl®) 5-10 mg ($\frac{1}{12}$ to $\frac{1}{6}$ gr)

(5) Diphenhydramine methylsulfate N N D (Prantal®) 100-200 mg ($1\frac{1}{2}$ to 3 gr)

(6) Methacopolamine Bromide N N D (Pamine®) 2-5 mg ($\frac{1}{4}$ to $\frac{1}{12}$ gr)

CONVALESCENT PHASE

Treatment

- A. Examination.** When a clinical quietness of the lesion is evident (based on freedom from symptoms) a repeat GI x-ray series is advisable to determine whether or not the ulcer is regaining evidence of healing of the ulcer. In the case of gastric lesions failure of clinical improvement and x-ray improvement of the ulcer crater within a period of 3-4 weeks on a careful medical regimen should be taken as suggestive evidence of malignant malignancy.
- B. Education of Patient Regarding Recurrence.**
1. The patient should be educated to an understanding of the chronicity and recurrent potentialities of his ailment as well as of the dangers due to complications which may follow neglectful improper treatment.
 2. Factors causing recurrence. It should be emphasized to the patient that the following factors are most frequently responsible for recurrence of ulcer:
 - a. Improper diet and irregular eating habits
 - b. Irregular living habits long or irregular hours
 - c. Use of alcohol or tobacco
 - d. Emotional stress
 - e. Infection particularly of the upper respiratory tract
 3. Management. Patient should be instructed to return to the Sippy regime or to a modification thereof in the event of recurrence of symptoms or even prophylactically if they are exposed to condition known to aggravate peptic ulcer. In addition to diet information antacid and other medication should be readily available to the patient.
- C. Rest and Rehabilitation.** Provision should be made for proper rest and vacation and the likelihood to promote physical and mental relaxation.
- D. Psychotherapy.** Selective patient should be considered for individual or group psychotherapy.

TREATMENT OF COMPLICATIONS

INTRACTABILITY TO TREATMENT

Although unusual cases undoubtedly exist where benign peptic ulcer fails to heal despite competent medical supervision it is probable that most are cases of stubborn and persistent ulceration of an intractable medical regime or of partial or complete failure of cooperation on the part of the patient. The factors previously mentioned as being responsible for recurrence of peptic ulcer are often the same factors which interfere with the healing of ulcer. The designation intractable should be reserved only for those patients who have been given adequate and supervised trial of the therapy. The possibility of malignancy or of other complications of the ulcer (e.g. pyloric obstruction perforation gastritis, etc.) must always be considered.

HEMORRHAGE

(Stomach code No 640 951 7) (Duodenum code No 651 951 7)

Although peptic ulceration accounts for about 70% of gross hemorrhage from the upper gastrointestinal tract one must consider the possibility of esophageal varices gastritis duodenitis carcinoma of the stomach hiatus hernia and systemic bleeding diseases

Treatment

A Emergency Measures for Hemorrhage and Shock

Refer to page 28 for general management of shock

- 1 Hospitalize patient at absolute rest
- 2 Warmth Keep patient comfortable If an ice bag is applied to the epigastrium avoid chilling the patient
- 3 Treatment of apprehension and anxiety
 - a Reassurance by word and manner of physician that the condition is not critical
 - b Rest Provide prompt mental and physical rest this can best be achieved in the hospital
 - c Sedation May be necessary
 - (1) Morphine should be avoided if possible since it may cause nausea Dose is 12-18 mg ($\frac{1}{2}$ - $\frac{1}{4}$ gr) subcut every 4-6 hours It is better to substitute codeine phosphate 30-65 mg ($\frac{1}{2}$ -1 gr) subcut or orally or dihydromorphine (Dilaudid®) 4 mg ($\frac{1}{16}$ gr) subcut every 4-6 hours p r n
 - (2) Sodium phenobarbital (sodium phenobarbital) 0.3-0.6 Gm ($\frac{1}{2}$ -1½ gr) subcut or orally during the first 24-48 hours
 - (3) Phenobarbital (phenobarbital) may be continued for several days if necessary
- 4 Oxygen Preferably by mask at 5-10 liters per minute (see page 145)
- 5 Transfusions There has been considerable controversy regarding the use of blood transfusions in bleeding ulcer However the generally agreed that the previous conservative attitude (feared that transfusion may raise the fallen blood pressure to a point allowing occurrence of hemorrhage) is warranted Certainly in severe hemorrhage the time rate and volume of blood administration should suit the physiological needs and large amounts of blood may be given when indicated Transfusions must always be given if hemorrhage is severe (Hgb < 50% or RBC < 2.5 million) if immediate surgery is contemplated or if symptoms of anemia or shock are not rapidly controlled Slow and continuous administration of 500 to 2500 or more of whole blood daily may be necessary
- 6 Clinical and laboratory studies
 - a Take pulse respiration and blood pressure every 1½-2 hours in the first 24 hours may give information regarding shock status in advance of blood change
 - b Observe all vomitus and stool for gross or occult blood
 - c Type and cross match the patient's blood as early as soon as possible Have whole blood on plasma available without delay

- d Obtain complete blood count and hematocrit initially and serially as indicated
- e Obtain blood N P N or urea nitrogen for comparison with late studies

B General Management

- 1 Corrected hydration and salt depletion
Hypodermoclysis Physiologic saline solution 1015 mlts daily by this method
- b Oral liquid feedings as soon as tolerated (see below)
- c Sodium chloride 3.6 Gm ($3/4$ 1 $1/2$ dr) may be added to each liter of liquid food mixture to prevent salt depletion
- 2 Nutrition
 - a Starvation The policy of initial starvation is subject to considerable controversy Since the patient is often nauseated and anorectic even in shock on the first day food may be safely withheld
 - b Fluids If patient is a vomiting thirst may be controlled by fluids given parenterally The patient may be permitted to dissolve ice chips or hard fruit flavored candy under the tongue to relieve thirst
 - c Diet If the patient is hungry and not vomiting it is wise to begin immediately administration of bland food stuffs
 - (1) Liquid diet It is best to begin with a liquid diet of bouillabaisse of milk and cream mixture (see page 52) Ling's upper intestinal antacid powder The 3.6 Gm ($3/4$ 1 $1/2$ dr) of sodium chloride may be added to each quart of milk cream mixture to prevent salt depletion
 - (2) Solid bland foods
 - (a) Conservative approach Solid bland food may be added when the patient has shown appreciable clinical improvement on the liquid (milk and cream) regimen within 12 weeks and when the patient's stools have shown no occult blood for 2-3 days
 - (b) Liberal approach (Ling's ulcerogenic diet) This method permits immediate feeding of all non-irritant high caloric foods but is preferred form

C Convalescent Care Following the acute episode the convalescent regimen such as outlined in uncomplicated peptic ulcer (see page 263) should be instituted

D Surgery Surgery should be considered if

- 1 The general condition of the patient fails to improve despite the above measures
- 2 Bleeding persists as evidenced by gross occult blood in stools If the patient's condition permits a gastrointestinal x-ray film should be performed to help localize the source of identify the character of the bleeding lesion Manipulation during such examinations should be a gentle as possible If oophorectomy are eliminated as a cause of bleeding and the bleeding persists for more than 2-3 weeks despite the patient's compliance to surgical intervention Do not wait until the patient becomes a poor operative risk before making this decision

PYLORIC OBSTRUCTION (code No 818)

It is important to differentiate pyloric obstruction due to spasm and edema from that due to scarring. The former condition may respond to medical treatment whereas the obstruction due to scarring is a surgical problem.

Treatment

- A Medical Measures (for obstruction due to spasm or edema)
 - 1 Bed rest preferably in the hospital
 - 2 Liberal use of antispasmodics (see page 266)
 - a Oral. If patient is able to retain oral medication
 - (1) Tincture of belladonna 10-20 drops t i d or q i d
 - or (2) Belladonna extract 15 mg (1/4 gr) t i d or q i d
 - b Parenteral. If the patient is unable to retain medication by mouth atropine sulfate 0.3-0.6 mg (1/200-1/100 gr) t i d or q i d subcutaneously
 - 3 Sedatives
 - a Phenobarbital (phenobarbitone) 15-30 mg (1/4-1/2 gr) t i d q i d
 - or b Phenobarbital sodium (phenobarbitone sodium) 0.665 Gm (1 gr) subcut every 8-12 hours p r n
 - 4 Nutrition
 - a Sippy I diet should be used initially gradually progressing to Sippy II, III and IV as tolerated (see page 54)
 - b Fluid or mineral imbalance must be corrected if vomiting is severe or prolonged. Parenteral methods are most satisfactory (see page 57 and 74)
 - c Hypoproteïnemia must be corrected since the resultant edema may increase pylorospasm
 - 5 Control of hyperacidity
 - a Gastric secretions should be aspirated every morning and night with a small gastric tube. Some clinicians feel that continuous gastric suction should be employed initially
 - b Antacids may be employed as for treatment of uncomplicated ulcer (see page 264) but avoid alkalosis from excessive use of soluble antacids since this increases pylorospasm
- B Surgical Measures (for obstruction due to scarring)
 - 1 Surgery is to be employed only when a thorough trial of conservative measures has failed
 - 2 The various recommended surgical procedures will not be discussed. It is currently the practice to perform gastric resection in most cases although some surgeons favor gastroenterostomy

PERFORATION DUE TO ULCER

(Stomach code No 640 951 3) (Duodenum code No 651 951 3)

Acute subacute and chronic perforation of peptic ulcers may occur. Acute perforation constitutes a medical emergency. Immediate surgical repair, preferably by simple surgical closure, is indicated. More extensive operations are generally unwise at the time of the acute episode because of the increased operative hazard due to the patient's usually poor physical condition. If the patient has been receiving corticotropin (ACTH) or cortisone, these drugs must be discontinued. If the patient has had no previous therapy or if previous therapy has been inadequate, he may then be placed upon a conservative medical regimen. If the patient has had an adequate trial of therapy prior to the episode, prepare him for possible further extensive operative procedures by transfusions and other supportive measures. The treatment of subacute or chronic perforation may be medical or surgical, depending upon the presence or absence of complications (e.g., abscess, involvement of neighboring viscera) or upon the persistence and severity of symptoms.

GASTRITIS (code No 640 3)

The stomach may become acutely or chronically inflamed due to a wide variety of specific and nonspecific causes. The symptoms of gastritis are poorly defined and variable. It is not unusual to have an absence of symptoms when present they loosely resemble the symptoms of peptic ulcer.

Physical examination is usually not diagnostic. X-ray findings are not remarkable until with gastric complications by atrophic hypertrophic erosive or sclerosing chronic changes.

Gastric acidity may be decreased in the chronic forms of gastritis and blood may be observed in the gastric contents and in the stool. Gastroscopic visualization may reveal characteristic mucosal changes which form the basis for clinical classification of gastritis. Patients with pernicious anemia who have atrophic gastritis must be observed carefully and periodically for evidence of malignant degeneration of polyps.

Treatment

- A General Measures. A dietary and drug treatment program essentially similar to that employed in peptic ulcer is useful (see pag 264)
- B Specific Measures. Remove or eliminate specific causative and aggravating factors (e.g., infection, alcohol, tobacco)

GASTRIC MALIGNANCY

(Carcinoma of the Stomach) (code No 640 8)

Carcinoma of the stomach should be suspected in all patients over 45 years of age who develop dyspepsia. This disease occurs more commonly in men than in women. Lesions occurring in the region of the greater curvature and prepyloric area are usually malignant. A high index of suspicion, careful x-ray gastroscopic

272 Diaphragmatic Hernia

studies and gastric analysis afford the greatest opportunity for early diagnosis. Unfortunately by the time the disease is manifest metastases usually have occurred and the lesion is no longer amenable to satisfactory surgical therapy.

Treatment

- A Specific Treatment (corrective). Early and thorough gastric resection is essential if the patient is a good operative risk. Patients should be afforded the opportunity of corrective surgery regardless of the apparently advanced nature of a malignant lesion.
- B General Measures (palliative). To be considered only when corrective surgery is impossible.
- 1 Simple shunting procedures (e.g. gastroenterostomy) in the event of pyloric obstruction.
 - 2 Symptomatic and supportive treatment as indicated.
 - 3 Narcotics should be given in adequate doses to alleviate suffering (see page 33).

DIAPHRAGMATIC HERNIA

(Congenital code No 275 037 H) (Traumatic code No 274-424)

Herniation of a portion of the abdominal viscera through a congenital or aquired defect (especially esophageal hiatus) of the diaphragm may be manifested by a wide variety of symptoms but classically by epigastric distress and dyspepsia noted especially on lying down after meals. Nausea vomiting, small hematemesis and anginal symptoms may occur. X-ray demonstration of the hernia is usually necessary to confirm the diagnosis. Small esophageal hiatus hernias which are of questionable clinical significance are reported frequently (estimated 10%) on routine x-ray gastrointestinal series.

Treatment

- A Treatment of functional dyspepsia (see page 260)
- 1 Small frequent feedings of bland easily tolerated food.
 - 2 Antispasmodic sedative medication (see page 266).
 - 3 Antacid powders frequently provide relief from heartburn (see page 264).
- B Instructions to Patient
- 1 Patient should be instructed to:
 - a Avoid lying down immediately after eating.
 - b Avoid exerting vigorously after eating.
 - 2 Patient should be advised to sleep in the semi Fowler position, or at least with upper part of body slightly elevated in an attempt to decrease acid regurgitation into the esophagus.
- C Surgical Treatment. 1 Correction of the hiatal defect is necessary if conservative management and hospitalization only if the symptoms are progressively increasing and fail to respond to conservative medical management.

DISEASES OF THE INTESTINES

REGIONAL ILEITIS (code No 644 952)

An acute or chronic inflammation of the distal portion of the small intestine characterized by ulceration and scarring and often associated with internal and external fistulae. The condition must be differentiated from other specific causes of enterocolitis (e.g. tuberculosis, chronic bacillary and amebic dysentery). The history often of long duration, is one of mild intermittent diarrhea and abdominal cramps relieved by bowel movement. The acute form may simulate appendicitis.

Physical findings may include tender masses in right or left lower quadrants, fistulous tracts and perirectal abscesses. Cultures of stool are often positive in the wet stools. Gastrointestinal x-ray series (small bowel study) reveals a loss of the mucosal pattern with narrowing and irregularity of the terminal ileum (string sign).

Treatment

- A. Corrective. Radiological primary resection of the involved portion of the bowel is the procedure of choice after a seasonable period of conservative medical therapy has been tried. Despite extensive surgical treatment the disease will recur fairly often.
- B. Paliative
 - 1 Diet. Bland high calor high vitamin adequate in protein.
 - 2 Symptomatic treatment of anemia and diarrhea with minerals and cod liver oil.
 - 3 Sulfonamides and antibiotics. Although of doubtful value, the sulfonamides which are poorly absorbed from the gastrointestinal tract might be given orally (e.g. 500). The effect of these is for polymycin and chlorotetracycline (Aureomycin®) have a definite complementary effect.
 - 4 Corticotropin (ACTH) and the corticosteroids produce beneficial results in certain patients with regional enteritis but results are quite variable and generally not too encouraging. Experience would indicate that long term use of these agents may not be without hazard and may result in increased destruction of intestinal tissue.
 - 5 Palliative surgery. Short circuiting operation may be necessary when involvement is extensive and complete.

DIVERTICULOSIS (code No 660 642)

DIVERTICULITIS (code No 660 642 0)

It is peculiarly or congenitally acquired (pouch like projections) may occur in any place along the course of the bowel especially the colon. In diverticulosis the lesions are asymptomatic and are discovered accidentally on x-ray examination. Inflammation of diverticula (diverticulitis) with symptoms of intestinal abdominal inflammation referable to the involved site occurs mainly in individuals above 40 years of age. Variably lower gastrointestinal symptoms occur depending on location of diverticula. Abdominal pain and tenderness of rectum and bowel disturbance which differ

entiation from acute appendicitis. Laboratory evidence of inflammation may exist and x ray demonstration of diverticula helps to confirm the diagnosis.

Treatment

- A General Measures** Conservative medical treatment is the method of choice.
- 1 Bland diet as tolerated
 - 2 Anticonstipation measures (see page 254)
 - 3 Coating agents. Non constipating antacid coating powders and gels, vegetable oils (olive oil), mineral oil or vegetable gum laxatives may be used (see page 255)
- B Surgical Treatment** May be indicated in the event of complication.

ULCERATIVE COLITIS (Nonspecific) (code No 860.951)

An acute or chronic inflammatory disease of the colon of undetermined cause. It responds poorly to treatment and has a strong tendency to chronicity and relapses. Symptoms include (1) disturbance of lower bowel function with either diarrhea (usual) or constipation and with blood or bloody mucus in the stools and (2) systemic disturbances, anorexia, weight loss, and then fever, anemia, and even profound debility.

Proctoscopic examination reveals a diffuse, superficially ulcerated bleeding mucosa. The presence of specific infectious organisms should always be ruled out by agglutination tests, stool examination for ova and parasites, and stool culture. Barium enema x ray appearance is that of decreased colon caliber, loss of haustral marking, and indistinct outline of the colonic mucosa.

Treatment

A General Measures

- 1 Rest. Bed rest is advisable, usually only in the acute phase. Adequate rest periods can form an effective part of the daily routine of most patients.
- 2 Nutrition
 - a Diet. The diet should be bland, yet as appetizing and nutritious as possible. A bland, high calorie, high protein, high vitamin diet is recommended. When no excretion is marked, it is permissible at times to use other than bland foods if the patient so desires. These patients can often tolerate meat fairly well.
 - b Elimination diet. If allergic factors are suspected, elimination diets may be employed to aid diagnosis.
 - c Supplemental vitamins may be administered especially if nutrition is markedly disturbed.
 - d Ferrous sulfate 0.2 to 0.4 Gm (3 to 6 gr) t.i.d. p.m. may be used to combat hypochromic anemia.
- 3 Psychotherapy. The exact role of psychological factors has not been determined. Certain personality types apparently are predisposed to the illness. In any case, anxiety-producing mechanisms should be eliminated where possible (see page 36). These patients must consider their standing and self-assurance.

4 Symptomatic and supportive treatment

- a Diarrhea The various antiperistaltic agents employed for any chronic diarrhea may be used (see page 258). Use of narcotic drug should be avoided if possible except for severe acute diarrhea. Antispasmodic drugs are often of value (see page 266). Metamucil® or other vegetable mucilage have been suggested to increase the bulk of the stool.
- b Nausea and vomiting (see page 251)
- c Cramps or tenesmus Hot water bottle to the abdomen and sedative antispasmodic medication may be employed.
- d Hypoproteinemia This is best corrected by high protein diet when renal findings are within tolerable limits. Protein hydrolysates dissolved in acceptable liquids such as milk, fruit juice, broth, etc. may be used to supplement the dietary protein when indicated. If hypoproteinemia is marked and associated or corrected by dietary means, blood plasma or whole blood transfusions may be necessary.
- e Bleeding tendency (due to hypoproteinemia) Treatment with menadione or other vitamin K preparations (see page 81 and 228) may be indicated.
- f Nervousness In addition to general psychotherapy, mild sedation is often necessary. These patients often show little response to various antispasmodic sedative mixtures (see page 266).

5 Anti-inflammatory agents These should not be considered to be specific for curative in the disease. However, good results and prolongation of remissions have been reported by some observers.

Sulfonamides Many preparations have been used. Isoniazid, sulfonamide, which has a poorly documented effect on intestinal transit, is preferred. Sulfasalazine (the U.S.P. (Sulfasalazine®) and Phthalylsulfathiazole (the U.S.P. (Sulfathiazole®)) are to be enjoyed at least in part for the Obstruction of the small intestine.

(1) Sulfasalazine® 3.0 Gm (45 gr) very 4 hours

(Should not be used if the patient has diarrhea)

(2) Sulfathiazole® 1.5 Gm (22½ gr) every 4 hours

(This dose may be doubled in cases of severe disease)

- b Antibiotics The tetracycline drugs have been employed but are of questionable value. Oral penicillin is of little value. Chlorotetracycline U.S.P. (Acomycin®) is preferred over the basis of limited experience to be used in the form of capsules of 2.4 Gm orally for courses of 4-6 weeks. Oxytetracycline U.S.P. (Tetracycline®) and Chloramphenicol U.S.P. (Chloromycetin®) are probably about as effective as the tetracycline.

6 Corticosteroids (ACTH) and the corticosteroids are known to induce remissions in many cases of the disease. They are usually given but may induce temporary suppression of the inflammatory exudative process. Their use may be considered in the case of the patient with clinical contraindications and the activity of the disease is interfering with other treatment measures.

Optimum dosage schedules have not been established for these drugs. They are usually given in courses during exacerbations. They should be administered in high doses and gradually reduced as symptoms disappear. (For dosage see page 423.) Reports indicate that relapse recurs when the drugs are discontinued before onset of the natural cyclical remission phase. It seems the drugs are used most profitably as adjuvants in the control of acute exacerbations of the disease and should probably be avoided for long term use.

- Surgical Measures These should be used only after careful prolonged medical therapy fails. This does not mean that the patient should be terminal or a poor operative risk before operation is considered. The choice of surgical procedures will not be discussed here. Subtotal or total colectomy may be employed initially or resorted to only after an extended trial of ileostomy or colostomy.

BACILLARY DYSENTERY (code No 660 116)

Bacillary dysentery is an acute or chronic infection with the dysentery (*Shigella*) group of bacilli involving primarily the colon. It is characterized by diarrhea, abdominal cramps, tenesmus and sigmoid tenderness. Stools contain blood, pus, mucus and microscopically large non-motile merozoites (or merozoites). Stool cultures are positive during the first week; agglutination tests are positive during the second week. The important bacteriological and clinical types include:

Organism	Distribution	Severity	Significant Agglutination	Fermentative	
				Lactose	Mannitol
<i>Shigella</i> <i>flexneri</i>	Tropical and subtropical (epidemic)	Severe	+	40	
<i>Shigella</i> <i>flexneri</i>	World wide	Mild	> 160		+
<i>Shigella</i> <i>sonnei</i>			> 320	+	+

Treatment

A Emergency Measures For severe cases

1. Isolate patient and use all contagion precautions.
2. Overcome dehydration and electrolyte imbalance by the liberal use of a saline and dextrose solution (see page 22) when necessary. The use of potassium solutions (see page 22). Urinary output should be kept at 1000-1500 cc (1 1/2 qt) per day.
3. Watch for circulatory collapse and shock in severe cases (see page 27).
4. Stool examination. Obtain specimen for microscopic examination and culture to determine causative organisms.

B Specific Measures The sulfonamide should be considered effective in the treatment of bacillary dysentery.

broad spectrum antibiotics appear to be gaining in favor. There is a significant variation in response of specific organisms in different individuals. Summary treatment is probably indicated only in severe acute Shigella infections and is used to combat the toxin of the infection.

1. **Antibiotics.** Administer tetracycline drugs and chloramphenicol in doses of 0.25 to 1.0 Gm every 6 hours.
2. **Sulfonamides.** Observe the usual precautions for sulfonamides and watch for signs of possible toxicity. Sulfadiazine is considered the drug of choice. Give 2.0 Gm (30.0 gr) Stat with equal or double quantities of sodium bicarbonate and follow with 1.0 Gm (15.0 gr) every 4 hours per os. If diarrhea is severe, larger doses by mouth or the use of sodium sulfadiazine parenterally may be necessary.
3. **Summary treatment.** Administer sulfonamide or broad spectrum antibiotics simultaneously.
 - a. **Bacillary dysentery polyvalent antitoxins.** Summary (not antibacterial). Test for sensitivity and administer 100 cc diluted tenfold in a saline solution I.V. tid until the toxemia is over.
 - b. **Shiga antitoxin.** Summary. Administer as above in doses of 40-80 cc in 0.9% of physiologic saline solution I.V. bid.

C. General Measures

1. Isolation. Disinfect all body discharges and bedding thoroughly.
2. Bed rest. When diarrhea is severe and patient is weak, it may be advisable to have the patient defecate on disposable absorbent pads to save the patient the physical exertion necessitated by use of the bedpan.
3. Initial purgation. Control rectal and probably not advisable.
4. Careful rectal hygiene.
5. Local heat to abdominal region to relieve pain.
6. Sedation.
 - a. Phenobarbital (phenobarbitone) 15-30 mg ($\frac{1}{4}$ - $\frac{1}{2}$ gr) orally tid or qid.
 - b. Pentobarbital sodium (pentobarbital sodium) 0.1-0.15 Gm ($\frac{1}{12}$ - $\frac{1}{8}$ g) orally prn.
7. Narcotics.
 - a. Codeine Phosphate U.S.P. 15-85 mg ($\frac{1}{4}$ -1 gr) orally or about prn pain.
 - b. Compounded Tincture of Opium U.S.P. (paregoric) 4-8 (1-2 dr) as necessary for pain and frequent loose bowel movements.
8. Atropine Sulfate U.S.P. 0.3-0.6 mg ($\frac{1}{200}$ - $\frac{1}{100}$ gr) orally subcutaneous for cramps.
9. Fluids. Adequate fluid intake by oral and parenteral routes should be forced to limit the total amount as indicated. Total oral fluid intake should approximate 3000 ml (3 qt) in the acute phase. On or more liter of parenteral saline solution daily may be necessary to replace fluid and electrolyte losses in profuse diarrhea.

10 Nutrition *Avoid starvation diets* However in severe cases patients should not be allowed to eat a normal diet for 1½ to 2 months after the acute phase. Give parenteral feedings if necessary. Evaluate bowel symptoms before adding the various dietary constituents.

- a Early acute stage Feedings of clear broths, rice water, albumin water, tea with 1 clove, barley water, or apple juice (not cider) at frequent intervals.
- b Late acute stage Gradually add as tolerated boiled milk, cereals and strained fruit juices, toasted soda crackers or bread, and gelatin desserts.
- c Subacute stage Gradually add as tolerated mashed potatoes, boiled rice, boiled chicken, soft cooked eggs, lean fish, sautéed beef, custards and puddings.

Chronic Bacillary Dysentery

The clinical manifestations and treatment of chronic bacillary dysentery are similar to those of chronic ulcerative colitis (see page 274).

FOOD POISONING

The term food poisoning ordinarily refers to the acute intoxication which results from the noxious agents or enterotoxins produced by bacteria. This is in contrast to gastrointestinal disturbances which are actually the result of infection of the gastrointestinal tract with microbial organisms (see page 276) or which are due to poisons of vegetable, animal or chemical origin (see pp 530 to 546). Food poisoning is a result of poor food hygiene either in preparation, processing, storage, distribution or handling. Suspicion of food poisoning should arise in instances of febrile gastrointestinal disturbance of acute onset especially when more than one individual in a family group or community is involved. A careful history and collection of specimens for a suspected food vomitus and stools for laboratory study may be indicated. Reporting to local health authorities is essential.

Treatment is symptomatic and supportive except in botulism for which specific antitoxin is indicated. Perform gastric lavage and withhold food, sedation and parenteral fluids. Liquid and soft diets (see page 46) are indicated in convalescence.

Organism	Onset After Ingestion	Severity	Treatment
<i>Clostridium botulinum</i>	12-24 hours	Very severe often fatal	Antitoxin (see page 473) Symptomatic and supportive
<i>Staphylococcus aureus</i>	1-6 hours	May be occasionally severe in 1-4 days	Symptomatic and supportive (see pp 252 and 258)
<i>Salmonella enteritidis</i>	8-24 hours	May be usually recover in 1-2 days	
<i>Streptococcus faecalis</i>	5-20 hours		

HEMORRHOIDS (Piles)

(Internal code No 66x 641) (External code No 67x 641)

Treatment

Treatment is directed at the 3 commonst disturbing manifestations bleeding prolapse and pruritus

A General Measures

- 1 Control constipation (see pag 254) Mineral oil 30 cc (1½ oz) h a and in early a m may be especially effective
- 2 Use of soft toilet tissue slightly moistened with water and good rectal hygiene are essential

B Specific Measures**1 Bleeding****a Palliative measures****(1) Local astringent suppositories**

(a) Tannic acid suppositories 0.203 Gm (3.5 gr)

(b) Bismuth subgallate suppositories 0.355 Gm

(3 1½ gr)

(2) Bed rest if necessary**b Surgical measures** Inject on or removal as indicated**2 Prolapse****a Palliative measures****(1) Replacement of prolapsed hemorrhoid with lubricated finger to prevent strangulation patient in lateral recumbent position****(2) Warm sitz baths 20-30 minutes t i d or q i d****(3) Local lubricant (petrolatum) to anal region****(4) Local anesthetic (e.g. Nupercaine® or benocaine) sedation and analgesia p r n****(5) Bed rest if possible****b Surgical measures as indicated****3 Burning and itching (see pag 80)** Lubricants and local anesthetic ointment in addition to above general measures**CARCINOMA OF THE COLON (code No 680 8)**

Carcinoma of the colon should always be suspected if patient is more than 40 years of age has had change in bowel habits rectal pain or bleeding or has unexplained anemia. Verify by digital examination (positive in 50% of cases) sigmoidoscopic examination (positive in 5%) and for lesions higher in the colon by barium enema.

Early surgical resection may be curative. If the lesion is inoperable treat symptomatically for constipation anemia pain etc.

DISEASES OF THE HEPATOBILIARY TRACT**INFECTIOUS HEPATITIS (code No 680 100)**

An acute infectious disease due to an unknown filterable agent. It is characterized by (1) prodromal symptoms of anorexia malaise nausea vomiting abdominal pain light fever and headache for 1-7 days (2) subsequent development of varying degrees of icterus.

bilirubinuria for days or weeks and (3) convalescent period of weakness and easy fatigability for days or weeks. The epidemic type has an incubation period of 3-6 weeks. The homologous serum type usually has an incubation period of 3-4 months. Infectious hepatitis may terminate fatally.

Differentiate from influenza, infectious mononucleosis, malaria, cholecystitis, yellow fever, leptospirosis, drug intoxication, quinine (Atabrine®) discoloration, and carotidemia.

Treatment

A. General Measures

1. Bed rest is absolutely necessary until the initial acute symptoms have subsided and should be maintained judiciously until there is no longer clinical or laboratory evidence of the acute disease. Absolute bed rest beyond the convalescent phase is not warranted. The return to activity during the convalescent period should be gradual.

2. Nutrition. Keep a close check on patient's actual intake and output.

a. Fluids and liquid foods. If patient is unable to take or retain food or fluids by mouth:

- (1) 5% glucose solution should be given I.V. with 5% protein in hydrolysate as needed to maintain nutrition and fluid balance. Saline infusions are to be used only to correct unusual losses of chloride by vomiting, etc.

- (2) Tub feedings of high carbohydrate formulas and skimmed milk as given below (and on page 59) should be used if vomiting is severe or protracted.

- (3) The use of irradiated plasma has been recommended but it is doubtful if present irradiation methods are effective in viral sterilization. Parenteral administration of protein hydrolysate or salt pool albumin may be necessary to maintain nitrogen balance.

b. Restricted solid foods. When patient's appetite improves, small frequent oral feeding of any of the following may be instituted as tolerated:

- (1) Fruit juices fortified with glucose every 2-3 hours.
- or (2) Powdered skimmed milk in chilled water every 2-3 hours.

or (3)

Dextrose	6-8 Tbsp	(90-120 cc)
Milk	1 Quart	(960 cc)

- (4) Supplementary vitamins, particularly of the B complex, may be incorporated to advantage in the feeding schedule if tolerated.

c. Full diet. As soon as the patient is able to eat an adequate diet, provide a high CHO and high protein diet (see page 58) and supplementary vitamins of the B complex.

d. Lipotropin agents such as choline, yescin, or methionine are of doubtful value.

e. Avoid physical exertion, necessary transportation, alcohol, all medication, whether prescribed or self-administered, barbiturates, morphine, and sulfonamide, and surgery, especially with general anesthesia.

3. Corticotropin (ACTH) has been reported to apparently exert a favorable effect on the progress in certain cases of acute hepatitis. Experience has been limited.

hazards of corticotrophin treatment in liver disease must be considered (see page 423)

B Prophylaxis

- 1 Isolation of infected individuals is recommended. Human immune globulin 10 c.c. 1 M may prevent or ameliorate the disease if given to exposed subjects during the incubation period.
- 2 Avoidance of saffy transfusions especially of possibly infected blood serum or plasma.

CHRONIC HEPATIC DISEASE

(Laennec's Cirrhosis code No 680 956)

(Following Acute Degeneration code No 680 952)

Etiology

Industrial chemist is hepatotoxic drug. Alcohol (in excess) use (viral) hepatitis chronic infection chronic biliary tract disease chronic malnutrition (see also page 4) to give the failure

Diagnosis

- A Symptoms Weakness sense of fatigability right upper quadrant discomfort variable symptoms of dyspepsia hematemesis melena abdominal swelling distended m. pruritus m. t. depression
- B Physical Examination Anemia weight loss pallor spider angiomas peripheral edema telangiectases hepatomegaly hepatic tenderness ascites spermatozoa dilatation of the liver nodes dependent edema
- C Laboratory Findings Anemia icterus decreased bile function (as measured by multiple liver function tests) (see page 280) Unfortunately no single test and often no group of tests is entirely reliable
- D Special Diagnosis Liver biopsy (punch) . esophagoscopy . x-ray demonstration of esophageal varices

Treatment

A Specific Measures

- 1 Removal of exogenous aggravating agent
 - a Industrial and household toxins
 - b Alcohol and opiates

Drugs: Coal tar drugs (e.g. sulfonamide fast acting barbiturates that are retarded by liver) and other agents such as (e.g. morphine sulfate)
- 2 Removal of endogenous aggravating factors
 - a Thyrotoxicosis
 - b Urgent conditions: Biliary tract disease pancreatic disease intestinal obstruction

Chronic infections Syphilis tuberculosis undulant fever amebiasis etc. Specifically cut viral hepatitis should be treated separately to prevent chronic hepatitis in the future (see page 279)

B General Measures

- 1 Physical Rest This is essential in the presence of hepatic disease of jaundice

2 Adequate nutrition

- a Diet A high caloric diet (at least 2500-3000 Calories) is recommended. Carbohydrates should supply the principal caloric re-*de*. Protein should be adequate but not too high especially in patients prone to prot*in* in intoxication. The diet should contain sufficient fat to be palatable. Patients with cirrhosis frequently complain of anorexia and so it is essential to make the i*ri*d*it* attractive and palatable as well as highly nutritious. Tube feedings may be necessary. Fried or greasy foods, highly spiced foods, and alcoholic beverages should be avoided.
- b Vitamins A and D Absorption of vitamins A and D in liver disease is impaired due to biliary deficiency. Vitamin A 5000 units and vitamin D 1000 units 1-2 times daily may be given. Perles may be preferred when anorexia is present.
- c Vitamin B complex factors have been widely used but it is questionable that lipotropic or other actions of this group of vitamins exert any striking beneficial results except in those circumstances where there is a deficiency of these vitamins (due to inadequate food intake). It is felt that if vitamin B complex administration is indicated it is provided by the following:
 - (1) Dried Yeast U.S.P. (brewer's yeast) powder 15-30 Gm daily or 20-30 0.6 Gm tablets daily
 - (2) Vitamin B complex high potency preparations
 - (3) Crude liver extract 1-2 cc i.m. 1-2 times weekly
- d Amino acid supplements (Protein Hydrolysate N.N.D.) may be incorporated in oral tube or parenteral feedings as indicated:
 - (1) Oral 2-15 Tbsp t.i.d. (to supply 30-400 Gm daily)
 - (2) Tube 2-15 Tbsp t.i.d. Rule out varices first
 - (3) i.v. 5% solution with 5% dextrose 1-3 liters daily
- e Skimmed milk may be used for oral or tube feedings.
- f Salt poor albumin 50-100 Gm daily may be employed in severe cases (very expensive).
- g Ascitic fluid Readministration of ascitic fluid by sterile technic (if prot*in* in ascitic fluid is greater than 1%).
- h Transfusions of whole blood if severe anemia and hypoproteinemias coexist.

3 Ascites and edema may be treated by

- a Low sodium diet Reduce sodium intake to less than 2 Gm NaCl daily (see p. 55) and even less if necessary. Diet is severely restricted in sodium and apt to be nutritionally inadequate and unpalatable but remarkable improvement of ascites, edema, liver disease, and portal hypertension has been reported on patients who have been on diets containing 200 mg (3 gr) sodium per day for periods of a few weeks or more than two years. The danger of inducing the so-called low salt syndrome with renal failure and death must be considered and watched for.
- b Attempt to restore plasma proteins to normal levels (see above). This is very difficult to achieve.
- c Chlorothiazide (Diaril[®]) 0.5 Gm b.i.d. q.i.d. or l.i.y. is stated to be effective in producing diuresis in certain patients with cirrhosis with ascites producing a marked

incr use in the excretion of sodium. The toxic side effects and potential toxicity have not been fully evaluated.

d. Mercaptal diuretics 1.2 cc S.V. or I.M. once or twice a week (see page 204).

e. Abdominal paracentesis is for pain, discomfort or inability to eat if necessary.

4. Anemia

a. Hypochromic anemia. Ferrous sulfate 0.3 to 0.3 Gm (3 412 gr) enteric coated tablets 1 to 3 p.c.

b. Hyperchromic macrocytic anemia. Crude liver extract 1.2 cc I.M. once or twice a week.

5. Hemorrhagic tendency due to hypoprothrombinemia may be treated with vitamin K preparation although this treatment is ineffective when intrahepatic damage is severe. Blood transfusions may be necessary to control the bleeding tendency. Some caution should be observed in using large doses of salicylates in these patients because of the enhanced hypoprothrombin effect.

a. Oral sodium naphthol U.S.P. M naphthol B.P. 1.2 tablets of 10 mg (140 gr) each tid p.c. If obstructive jaundice is present give supplementary bile salts (see page 286).

b. I.V. or I.M. M naphthol Sodium Bisulfite U.S.P. 2 mg (130 gr) every other day.

6. Hemorrhage from esophageal varices. If severe bleeding can at times be controlled by the use of the triple lumen tube. Surgical measures are usually hazardous and unsatisfactory but surgery to relieve portal hypertension may be considered in selected patients. In young patients in otherwise good condition in whom hepatocellular dysfunction is relatively slight portal anastomosis may be of benefit.

7. Miscellaneous problems

a. Pruritus (see page 66), nausea and vomiting (see page 251) and constipation (see page 214).

b. Corticotropin (ACTH) and the corticosteroids. These agents should be used with careful consideration of the danger of hemorrhage tendency portal thrombosis and sodium retention. They are best not used in advanced cirrhosis.

ACUTE CHOLECYSTITIS (code No. 687 100)

Acute inflammation of the gallbladder may consist of any one of a wide variety of pathological lesions of the gallbladder which are difficult to differentiate clinically. The conditions may develop as a result of obstruction of the biliary passages with or without stones or as a result of infection. Clinical findings may vary considerably in individual cases but for purposes of management they may be conveniently divided into 3 groups according to severity: mild, intermediate and severe.

Diagnosis

A. Symptoms

1. History of chronic dyspepsia or previous biliary calculi may or may not be elicited.

- 2 Attacks of right upper quadrant colic frequently nocturnal with residual gallbladder tenderness occur
- 3 Nausea and vomiting are usually present during acute episodes

B Physical Examination

- 1 Jaundice may occur during or following attacks
- 2 Localized right upper quadrant tenderness is common
- 3 Fever may be present or absent

C Laboratory Findings

- 1 Leukocytosis is inconstant
- 2 Icterus index is elevated in common duct obstruction
- 3 X ray findings are variable and at times difficult to interpret. A gallbladder which fills poorly with the dye or empties slowly may be normal. Demonstration of stone in the cholecystogram is the most important finding

Treatment

A Mild Type (Mild or indefinite symptoms, Doubtful diagnosis)

- 1 Bed rest. Make frequent observations including repeated gentle abdominal examinations as indicated
- 2 Routine laboratory studies and icterus index
- 3 I V fluids. If patient is vomiting administer 5% glucose in saline solution I V. Later when tolerated add bland oral food and fluids gradually to diet as in patients with a viral enteritis (see page 274)
- 4 Apply local heat or cold to the abdomen
- 5 Sedative or analgesic drugs as required (see below)
- 6 After a quiet episode has subsided carry out further diagnostic studies (e.g. GB series) as indicated
- 7 Elective surgery may be considered later if
 - a Episodes of ulcer history tilt toward definite severe or recurrent
 - b Cholelithiasis especially if condition is symptomatic (or if asymptomatic and patient is less than 45 years of age)
 - c Secondary disease exists in related structures (e.g. liver, pancreas)

B Intermediate Type (Symptoms are moderate and definite and the patient's general condition a good basis for the subsequent clinical course is unpredictable)

- 1 Bed rest is hospital. Follow patient by careful frequent observations and monitoring of vital signs and repeated gentle abdominal examinations as indicated
- 2 Perform WBC and differential count every 12 hours and icterus index on serum bilirubin daily (if jaundice is suspected or present). Blood electrolytes, NPN and serum amylase studies may be indicated
- 3 Plain x rays of the abdomen are of value if the patient's physical condition permits it. Postpone cholecystograms until acute phase has passed
- 4 Nasal duodenal suction should be employed for abdominal distention and vomiting
- 5 Fluid and electrolyte balance to be maintained by parenteral fluids as indicated
- 6 Sedation. Phenobarbital sodium (phenobarbital sodium) 0.055 to 0.13 Gm (1 to 2 gr) or pentobarbital sodium (pentobarbital sodium) 0.055 to 0.13 Gm (1 to 2 gr) or pentobarbital sodium (pentobarbital sodium) 0.055 to 0.13 Gm (1 to 2 gr) or pentobarbital sodium (pentobarbital sodium) 0.055 to 0.13 Gm (1 to 2 gr)

ba bitone sodium) N 1 0 3 Gm ($1\frac{1}{2}$ 5 g) I M or by rectal suppository

7 Analgesia Use the following gly or in combination

a Codeine Phosphate U S P 30 65 mg ($\frac{1}{2}$ 1 g) q 4 hours p r n

b Morphine Sulfate U S P 10 16 mg ($\frac{1}{8}$ $\frac{1}{4}$ gr) q 4 hours p r n as required only

c Atropine Sulfate U S P 0 4 0 6 mg ($\frac{1}{150}$ $\frac{1}{100}$ gr) q 4 hours p r n for severe pain only

d Glyceryl Trinitrate U S P (nitroglycerine) 0 3 0 6 mg ($\frac{1}{200}$ $\frac{1}{100}$ g) under tongue p r n

Papaverine 65 mg (1 g) q 4 hours p r n

8 Ex laparotomy When clinical and laboratory evidence points to progression during the first day of observation or if they show no evidence of improvement after the first 2 days operative intervention is usually indicated (cholecystectomy)

9 Elective surgery When there is clinical and laboratory evidence of improvement during the first day of observation the patient should be managed conservatively until symptoms have subsided

a Perform necessary x ray and laboratory studies to confirm diagnosis and to evaluate the patient's physiological status

(1) Icterus index Surgical risk is less when this is falling than when it is rising

(2) Cholel cystogram Preferably after jaundice clears

(3) Liver function tests (see page 280) plasma prothrombin, serum proteins and serum electrolytes may provide valuable information

b Prepare for subsequent elective surgery by high CHO adequate protein low fat diet with supplementary vitamins plasma and whole blood transfusion as needed and Menadione Sodium Bisulfite U S P (vitamin K) 2 mg ($\frac{1}{50}$ gr) 1 V every other day if jaundice is present or prothrombin is low

Poor surgical risk patients include aged and over atherosclerotic and excessively obese patients should be operated upon only if a full individual evaluation

d Final emergency Cholel cystectomy should be performed only if the patient has been adequately prepared for operation Common duct exploration is carried out at the time of cholecystectomy

C Cholecystitis In case of empyema gangrene perforation and bulging of the gallbladder cholecystectomy is usually the treatment of choice After cholecystectomy when the patient is a suitable condition has subsided perform cholangiography to determine presence of stones and patency of common duct If the patient is a good surgical risk prepare adequately for elective operation (as above)

**CHRONIC CHOLECYSTITIS (code No 587 100 0)
CHOLELITHIASIS (Gallbladder) (code No 687-615)**

As with acute cholecystitis chronic inflammations of the gall bladder may be grouped together clinically irrespective of the wide variety of pathologic lesions. The disease usually follows repeated attacks of acute cholecystitis or may be due to chronic biliary stasis, biliary stones or infection. Many patients who exhibit symptoms of so called chronic gallbladder disease are actually suffering from functional GI disturbances e.g. nervous dyspepsia (see page 260). The management of cholecystitis without stones is usually a medical problem. When associated with stones the condition often requires surgery. The question of surgery for asymptomatic cholelithiasis (silent gallstones) remains extremely controversial and the decision to operate must be individualized for each patient.

Diagnosis

- A History Recurrent episodes of shifting upper abdominal distress largely in the right upper quadrant occasionally episodes of acute colic abdominal distention nausea and vomiting and intolerance of fatty and gas forming foods
- B Laboratory Examination
 - 1 Gallbladder dye demonstration of poorly functioning gall bladder (poor filling and emptying on repeated examination) and/or biliary calculi
 - 2 Duodenal drainage may demonstrate excessive quantities of exfoliated epithelium mucus bacteria and pus in dark fraction of bile

Treatment

A Medical Management

- 1 Indications
 - a Patients without clinical or x ray evidence of stones who respond to careful medical treatment
 - b Questionable diagnosis or low grade symptoms Suffer instead from functional dyspepsia (a difficult problem)
 - c Patients who refuse surgical treatment
 - d Poor operative risk patients
 - e Patients with a short life expectancy from other cause
- 2 Treatment
 - a Diet In general 2 different types of diet
 - (1) Low fat diet (classical type) This diet excludes both cooked and uncooked fats from all sources (see page 54)
 - (2) No grease diet (modern concept) This diet excludes only the cooked fats (grease) which at non emulsified at body temperature but includes the uncooked fats such as re emulsified at body temperature. The first phase of this diet is similar to the Sippy diet with frequent feedings of milk and cream as improvement occurs the diet incorporates egg butter cooked vegetables and fruit and cereals as tolerated
 - b Antispasmodic medication Very useful
 - (1) Tincture of belladonna 10 drops t.i.d. a.c.
 - (2) Belladonna extract 15 mg (1/2 gr) t.i.d. a.c.
 - (3) Phenobarbital antispasmodic mixtures (see page 264)

- (4) Atropine sulfate 0.4 to 0.6 mg ($\frac{1}{150}$ to $\frac{1}{100}$ gr) orally or sublingually or subcutaneously
- c Bile acid preparations Not to be used in patients with biliary calculus to complete mechanical obstruction. A choleragogue stimulates evacuation of the gallbladder and choleric alters secretion of the bile constituents a hydrocholeretic also volume of bile
- (1) Dihydrocholonic Acid U.S.P. (Decholin®) 0.3 Gm ($\frac{3}{4}$ gr) tid p.c. choleric (?) hydrocholeretic
- (2) Ox Bile Extract Capsules N.F. 0.3 Gm (5 gr) or tablet 0.2 Gm (3 gr) tid p.c. choleragogue choleric and hydrocholeric
- d Sedation Phenobarbital antispasmodic mixtures (see page 266) and barbiturates (see page 39)
- e Antacids These drugs frequently provide symptomatic relief of many of the annoying symptoms of gallbladder dyspepsia. Their mode of action is not clear but they are felt to relieve gastric hyperacidity and to have soothing effect on the duodenum and sphincter (see page 264)
- f Laxative drug (cathartic)
- (1) Sodium Phosphate N.F. (disodium phosphate) 4.8 Gm (12 dr 12 tsp) dissolved in warm water before breakfast
- (2) Magesium Sulfate U.S.P. (Epsom salts) Doseful 4.8 Gm (12 dr or 12 tsp) dissolved in warm water before bedtime. This may be used initially but prolonged use is inadvisable
- g Local heat to abdomen. Hot water bottle or electric pad preferred for mild discomfort

B Surgical Management

- 1 Indications (providing the patient is a good surgical risk)
- a Patient with clinical or x-ray evidence of stone who fails to respond to intensive medical treatment. Surgical results however also questionable
- b Patients with biliary stones with or without jaundice who have persistent attacks of right upper abdominal quadrant pain. A symptomatic cholelithiasis is present in less than 45 years of age indicated by common to be an indication for surgery
- Patient with suspicion of gallbladder malignancy
- 2 Cholecystectomy contraindicated in general cholecystitis if my preference is to the pill treatment except when the surgical risk is poor the patient is seriously ill then a therapeutic indication

DISEASES OF THE PANCREAS

ACUTE PANCREATITIS (code No 690.930)

Acute pancreatitis is characterized by a sudden onset of severe agonizing constant or intermittent pain often extending to the mid back shoulder flanks. Symptoms of vasomotor collapse (shock) may be present. Pseudotumescence of obstipation and vomiting often occur. Apathy of dyspepsia ulcer and gallbladder disease

may be elicited. Physical examination reveals epigastric tenderness and rigidity. There is usually abdominal distention. There is an elevation of serum amylase and lipase levels (may be transitory). Leukocytosis is common and glycosuria may occur.

Treatment

- A Emergency Measures for Impending Shock (Vasomotor Collapse) (see page 27)
 - 1 Bed rest in shock position (see page 3)
 - 2 Morphine sulfate U.S.P. 15-20 mg ($\frac{1}{4}$ - $\frac{1}{3}$ gr) subcut or if necessary I.V. may be employed for the relief of pain. Perhaps meperidine (Demerol®) 100-150 mg might be of value as a substitute for morphine sulfate because of its all-grip antispasmodic action.
 - 3 Atropine Sulfate U.S.P. 0.4-0.6 mg ($\frac{1}{150}$ - $\frac{1}{100}$ gr) subcut should be given as an antispasmodic.
 - 4 Glyceryl Trinitrate U.S.P. (nitroglycerine) 0.3-0.6 mg ($\frac{1}{200}$ - $\frac{1}{100}$ gr) sublingually may be employed for relief of severe pain.
 - 5 Parenteral fluids
 - a Plasma. Give 250-500 cc of plasma I.V. immediately and follow with subsequent infusion of plasma as necessary to correct dehydration.
 - b Crystalloids. 5% glucose and/or normal saline may be used initially in lieu of plasma (when the latter is not available) to correct altered fluid and mineral imbalance.
 - 6 Withhold food and fluid by mouth.
 - 7 Employ continuous gastric suction.
 - 8 Careful observation. The patient should be constantly attended and vital signs should be checked at 1-30 minute intervals. A indicated during the acute period. Blood count, hematocrit, serum amylase and lipase should be checked.
- B Follow-up. After the patient has recovered from shock or if patient has not developed shock 24 hours after attack should be considered with regard to future immediate management.
 - 1 Conservative or expectant management. This is to be preferred when vascular blood flow is adequate. The patient should be observed closely for evidence of continuing inflammation of the pancreas and/or related structures. The opinion of a surgical consultant should be obtained in every case of a suspected acute pancreatitis. Immediate surgical intervention. When the diagnosis is in doubt and there is a possibility of a focus and surgically correctable lesion (e.g., perforated peptic ulcer) an exploratory laparotomy may be indicated.
 - 3 Observation. The course of the inflammatory process should be observed by frequent repeated physical examination and blood counts and by blood sugar levels and serum and urine enzyme determinations as indicated.
 - 4 Supportive therapy
 - a No fluid or foods should be given by mouth for the first 48 hours and continuous gastric suction should be maintained for that period.
 - b After 48-72 hours small quantities of bland low fat liquid foods may be introduced gradually by mouth. If required. Gastric suction may be temporary or continued.

several times during the day for small oral feedings and then gradually discontinued depending upon clinical progress.

Fluid and electrolyte balance is maintained by appropriate

enteral fluid (page 7)

Atopine sulfate 0.4-0.6 mg ($\frac{1}{4}$ - $\frac{1}{2}$ 100 gr) as but may be administered tid in an attempt to suppress pancreatic secretion.

C C v l e s i C e W h i n i d e o f p a n c r e a t i t i s clear d

1 Bland low fat diet should be given

2 Drug

a Atropine sulfate 15 mg ($\frac{1}{4}$ g) tid or atropine

sulfate 0.4-0.6 mg ($\frac{1}{4}$ - $\frac{1}{2}$ 100 g) tid

b Antacid may be of aid (see page 264)

3 E l a s t p a t e n t o u r g e C n s i d e r h p a t i c fully r e s u r g i t m n t f b i l i y t r a c t d e a s e t h l p p r t r c u r r n f a t t k S p h i c t e r o t o m y b e i n d i c a t e d i n u r e n t p a t i o f r e c u r r e n t i o

b Insulin and testosterone

P o p h y l a s

A All associated logical factors should be noted e.g. biliousness, disease, duodenal ulcer, etc.

B D i e t i n s h e h a d p r e v i s i d t t k s o f u t p a e t i h o u d b p l d n l o w f a t d i e t a r y e g i m e a n d p r e m i t t e n o t h i s m a y r e d u c e t h e p o s s i b i l i t y f s u b e q u a n t a t t e

CHRONIC PANCREATITIS (code No. 690 956)

Chronic inflammation of the pancreas is associated with fibrosis of the gland. In the interlobular type the extent is extensive and often diffuse and digestive dysfunction. In the interstitial type the extent is localized and diabetes develops.

Acutely pancreatitis is a malignant disease. Pancreatic ulceration, peptic ulcers, hepatobiliary disease, and generalized arteriosclerosis are common causes.

The disease is characterized by upper abdominal pain and tenderness, flatulence, and bowli gulation. The physical examination reveals epigastric tenderness.

Laboratory findings may include bulky, foul, fatty stool, nitrogenous and glycosuria, and elevation of pancreatic enzymes in the blood.

Pancreatic alcoholism may be associated with chronic pancreatitis.

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Pancreatic alcoholism may be associated with chronic pancreatitis.

supplement natural proteins. If diabetic present dietary modification may be necessary (see page 57)

- b Vitamins. Multivitamin tablets and a complex vitamin should be given
- c Calcium salts. Calcium gluconate 1 Gm (15 gr) tablet 2-3 tablets t.i.d. may be given to help replace calcium lost in stool
- d Replacement of deficient pancreatic enzymes. Pankreatin (tablets) strength 0.32 Gm (5 gr) equivalent to 15 g. Pankreatin NF. Enteric coated 1-3 or more tablets t.i.d. p.c. p.r.n.
- e Detergent agent (e.g. so-butanemol) are of doubtful value in correcting impaired fat and calcium absorption

3. Drugs

- a Ox-Bile Extract NF (bile salts) 0.5 Gm (7½ gr) t.i.d. p.m. may be of value
- b Diluted Hydrochloric Acid NF. B.P. 1040 (16-64 min) t.i.d. with meals
- c Ferric Sulfate U.S.P. 0.2-0.3 Gm (3-4½ gr) t.i.d. p. for anemia
- d Insulin for diabetes when present (see page 395)

PANCREATIC CARCINOMA (code No. 690.8)

Incidence of the pancreas carcinoma is commonly in males over 50 years of age. It is characterized by epigastric pain extending to the back rapidly and marked weight loss and multiple gastrointestinal complaints. Physical examination may reveal an epigastric mass, distention and hepatic enlargement. Laboratory findings include evidence of disturbances of carbohydrate metabolism, elevation of serum lipase and amylase and widening of duodenal loop revealing S configuration of duodenum on x-ray.

Treatment

A. Non-operative Measures. Symptomatic and palliative

B. Surgical Measures

- 1 Radical resection in selected cases
- 2 Palliative surgical operations. Biliary tract shunting procedure in individuals associated with jaundice

Chapter 11

DISEASES OF THE URINARY SYSTEM

NONSPECIFIC URINARY SYMPTOMS

Urinary symptoms should never be ignored. Symptomatic treatment must never be substituted for a thorough investigation of the underlying organic or functional abnormality.

FREQUENCY OF URINATION (code No 706) (Nocturnal code No 707)

Frequency is one of the most common of the urinary symptoms and may occur either during the day or night. It may be caused by any of a variety of organic or functional disorders and is often of psychogenic origin.

If the symptom is disturbing to the patient treatment can be instituted while diagnostic procedures are being completed. Use antispasmodic sedative drugs as for dysuria (see below). Fluid restriction may be employed particularly at night if there are no contraindications.

DYSURIA (code No 704)

Dysuria may be caused by infection of the genitourinary system or by lesions of the lower urinary tract. It is usually associated with urgency and frequency. Mild discomfort may also be produced by a highly concentrated acid urine.

Treatment

- A Specific Measures** Treatment underlying disease
- B Symptomatic Measures** Antispasmodic and sedative drugs
- 1 Atropine Sulfate U.S.P. B.P. 0.4 to 0.6 mg (1/150 to 1/100 gr) every 3 to 4 hours or other parasympatholytic drugs (see page 34)
 - 2 Phenobarbital U.S.P. Phenobarbital B.P. 30 mg (1/4 to 1/2 gr) 3 to 4 times a day or more as needed
 - 3 Bladder sedative mixture
 Potassium citrate 30 to 50
 Hyoscyamus tincture 30 to 40
 Elixir of phenobarbital q.s. ad 120 to 310
 Sig. 4 cc (1 dr) 3 to 4 times a day and before or after meals

OLIGURIA (code No 702) and ANURIA (code No 703) (also see Lower Nephron Nephrosis page 303)

Oliguria and anuria usually serious symptom and may be due to many causes. Check ongoing state of fluid dehydration renal failure or other less common disorders. It is important to differentiate at these symptoms from urinary retention.

Treatment

A Specific Measures Treatment depending on cause

B Fluid Do not give excess fluids to patients with oliguria or anuria due to renal failure death will result from overhydration. Simplified hydration due to inadequate fluid intake in elderly (caused by severe peripheral diarrhea) usually corrected by oral or parenteral fluids. Replace any electrolyte (see page 15)

RETENTION OF URINE (code No 705)

Urinary retention due to obstruction may be the cause of hemic and most commonly distention of the prostate. The bladder may be percussed and palpated above the symphysis.

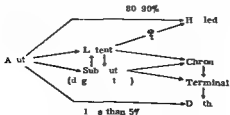
Please patient now maintain weight until the spontaneous voiding is established by other means. If this is unsuccessful cannot be emptied the patient should be catheterized. Correction of underlying abnormality necessary to prevent recurrence.

SPECIFIC DISEASES OF THE KIDNEY

GLOMERULONEPHRITIS

Glomerulonephritis apparently different varieties primarily involving both kidneys. The disease is believed by some to be a delayed allergic reaction to bacterial infection (usually streptococcal infection). The bacteria and their nephrons of the disease represent a progression of the well-known acute renal disease.

The course of the disease can be followed by the following chart:



It is difficult in the initial attack to predict the course of the disease. However, about 80% of the patients have mild damage which allows for healing. Most of the other 20% enter the so called latent phase and the nature of the progression of the disease seems to depend primarily upon the extent of the renal lesion. The greater the amount of initial damage, the more rapid the progression to subacute, terminal stages and death. By proper treatment it may be possible to retard this process.

Diagnosis

Diagnosis of glomerulonephritis rests primarily upon the urinary findings of red blood cells and/or red blood cell casts; therefore, a careful examination of a freshly voided urine specimen is the best single examination in making the diagnosis.

General Principles of Treatment

The problems of therapy in renal disease are threefold. Treatment of each aspect of the disease will be discussed in terms of these principles:

A. Addis's Principle of Rest The cause of the progression of the renal lesion in glomerulonephritis is unknown. Addis suggested that progression is due to too great a work load for the amount of functioning renal tissue remaining. Most of the work of the kidney was assumed to be involved in the concentration of solutes (i.e., the reabsorption of water against osmotic pressure). Urea is the most important solute. He suggested that the loss of urea (from protein catabolism) and the reabsorption of water is the less work.

However, it has recently been shown that the percentage of energy utilized by the kidney (O_2 consumed) in the concentration of solutes is such a small fraction of the total as to make this thesis untenable.

On the other hand, the empirical evidence of Addis's principles has not yet been refuted. Therefore, an adequate but minimal protein intake remains important in influencing the course of the disease.

B. Correction of Physiological Abnormalities Since many of the manifestations of renal disease are associated with marked physiological abnormalities (e.g., hypoalbuminemia in the nephrotic syndrome), the appropriate treatment is correcting these physiological disturbances as they occur. However, many of the defects apparently corrected quickly revert to the disease state as soon as therapy is stopped (e.g., return of hypoalbuminemia after I.V. albumin is stopped). This may make continued intensive therapy imperative if one wishes to prolong life, especially in terminal cases. However, do not use therapeutic means which appear to correct the physiological defect but which are in themselves unphysiological or tend to defeat Principle A above (e.g., high protein diet to correct hypoproteinemia).

C. Complications Complications are treated as they arise and are discussed in the appropriate section.

ACUTE GLOMERULONEPHRITIS (code No 712 100)

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Diagnosis

The history usually recalls an onset of hematuria, puffiness about the eyes, headache and occasionally in late and severe occurring 7 to 10 days after an infection (usually sore throat). The urine usually has a low specific gravity except when oliguria is present in which case it may be elevated. The urine sediment is loaded with red cells and white cells (tubular cells) but has only a few casts. Red cell casts are pathognomonic. Mild to moderate proteinuria is present. There may be increased blood volume and apparent or real anemia. The serum blood urea nitrogen and creatinine may be elevated. Hypertension is usually present.

Treatment

- A. Specific Measures There is no specific treatment. Treatment of acute nephritis with corticotrophin (ACTH) or the cortisone has been generally quite unsatisfactory. A few cases respond well but these are exceptions. Great care must be exercised in the use of corticotrophin (ACTH) or the cortisone in this disease. I overdoses (see p. 53) lead to increased edema and proteinuria. Sodium restriction should be rigidly observed (see p. 53). There is little that can be done to alter the abnormal physiology in increased blood volume and elevated N.P.N. etc. These tend to disappear spontaneously as the condition improves.
- B. Home Care & Hospitalization The average case of acute nephritis can be cared for in the home although a hospitalization becomes necessary if complications develop.
- C. Bed Rest The patient should remain in bed but may have bathroom privileges. The duration of the period of bed rest is difficult to anticipate but it probably lasts until the sedimentation rate is below 10 mm/hr or until the sedimentation rate is normal. A good general rule is to keep the patient in bed until the sedimentation rate is normal for at least 2 weeks or until the urinary findings show not more than 0.3 Gm protein/24 hours. Do not allow the patient to get up until they are symptom-free for 14 days. Return to activity should be gradual.
- D. Diet I (1) High caloric diet with protein restriction is indicated. Give 20-30 Gm protein/Kg (0.1-0.15 Gm/lb) body weight for the first 10 days. Then increase to 0.5 Gm (Kg) (0.25 Gm/lb) body weight plus the amount of protein lost in the urine.
- E. Fluids and potassium Restricting fluids and potassium is indicated in the early stages but all potassium fluids should be adjusted to maintain fluid restriction may be necessary if oliguria develops. Fluid restriction may be necessary during the early phase of the disease but should be discontinued by the third phase.
- F. Diuretics are rarely indicated except in cases of severe edema.

assoc. with dehydration or abnormal fluid losses. In these cases it is important to give parenteral serum albumin 0.2 Gm./Kg. (0.1 Gm./lb.) of body weight and sufficient glucose to maintain as close to an isocaloric intake as possible. Give I.V. fluids slowly.

4. Blood. If anemia is marked, a carefully cross-matched blood transfusion may be administered slowly.

C. Treatment of Complications

1. Cerebral edema with resultant headache and convulsions.
 - a. If headaches are not severe and convulsions are not present, give sodium pentobarbital 15-60 mg. (1/4-1 gr.) or paraldehyde 4-8 cc. (1-2 dr.) b.i.d. to q.i.d. as necessary.
 - b. If headaches are severe and convulsions are present, give magnesium sulfate 1.0 Gm. (15 gr.) (10 cc. of 10% solution) I.V. slowly. *CAUTION* whenever administering magnesium sulfate I.V. always have syringes filled with 10 cc. of 10% solution of calcium gluconate or other calcium salt ready to administer I.V. if narcosis develops or respiration ceases.
2. Cardiac failure. One of the most common causes of death in acute nephritis is acute cardiac failure. At the first sign of failure, digitalization should be instituted by one of the rapid methods (see page 197). Sodium restriction should also be instituted immediately.
3. Focal infections. Any focal infection, especially of an acute nature, should be treated promptly. Chemotherapeutic agents and antibiotics may be used as necessary for this purpose, but they are of no value in the therapy of the nephritis itself. Effective blood levels of sulfonamides and penicillin may be maintained with smaller doses than under ordinary clinical circumstances; this is due to the decreased tubular excretion (especially of penicillin) of the decreased glomerular filtration (as with Monamid).

SUBACUTE GLOMERULONEPHRITIS (code No. 712.100.0) (Nephrotic Syndrome, code No. 713.x40 or Degenerative Nephritis)

Diagnosis

A history of previous acute nephritis may not be elicited. The question of whether all cases of the nephrotic syndrome are preceded by acute nephritis has not been settled, but it appears that they are not. The most common physical finding is marked pitting edema. Proteinuria is marked, the urinary sediment may contain many atypical (especially fatty) casts, and many pathologic cells. Blood N.P.N. is elevated slightly or moderately. Serum albumin is low and there is a marked lipemia. Anemia may also be found. Azotemia is also present sometimes.

Treatment

A. Specific Measures. Corticotropin (ACTH) and cortisone have been employed in the treatment of subacute nephritis with

1. **Client's Response** The use of these hormone results in a marked decrease or even disappearance of the albuminuria with a subsequent or concomitant diuresis and a gradual return of serum albumin to normal levels. The dosage and duration of administration are quite variable. There are two main points of view.

1. **Intermittent therapy** The drugs are given in short courses of 7-14 days and repeated as necessary. Over 50% of patients so treated have relapsed promptly (see page 423 for dosage).
2. **Continuous therapy** The advocates of continuous cortisone (ACTH) and prednisone point out that this is a chronic disease and that there is no evidence that these drugs in any way influence the ultimate course. The drugs are given continuously in the lowest dosage possible to keep the disease under control (e.g., urine free of protein).
 All patients for administration of cortisone (ACTH) and the corticosteroids should be observed.

B. General Measures

1. **Rest** The patient is kept in bed for the kidneys as continued in this illness (see page 294). The stage may represent progressive renal disease and lead into the terminal stage. The treatment may be required if the condition is severe and of a chronic nature.
2. **Diet** Because of the massive albuminuria an attempt must be made to keep the body in nitrogen balance but at the same time not to overload the kidney. There is no evidence that the hypoproteinemia can be corrected by a high protein diet per se. During long-term administration of cortisone (ACTH) or the corticosteroids, it should be taken that the protein intake is adequate—at least 2 Gm./kg. (0.5 Gm./lb.) per day.
 Adults: 0.5 Gm. protein/kg. (0.13 Gm./lb.) body weight per 24 hours plus an amount of protein per 24 hours that is equal to the nitrogen intake. (Example: 70 Kg. man with proteinuria of 10 Gm./day = 0.5 Gm./kg. body weight = 35 Gm. protein = 10 Gm. leucine in urine = 10 Gm. protein. Total = 45 Gm. protein per day as the proximal intake.)
 Adults: 0.15 Gm. protein/kg. (0.35 Gm./lb.) body weight per 24 hours plus urine loss.
3. **Treatment of edema** The purpose of the pyrexia, physiological interpretation of the treatment is not clear. For this the renal disease is also treated.
 Sodium restriction. The probably the most effective method of relieving edema is by restriction of sodium. When a diuretic is used the sodium restriction is not so low as 10 Gm. (13 gr.) per day (i.e., restriction to 0.5 Gm. (7.42 gr.) per day may be necessary). This restriction should not be carried longer than is clinically necessary and when the restriction is marked the patient should be watched for symptoms of sodium deficiency. Salt substitutes should not be employed. Educate patient to live on low salt intake. Long-term use of excretory resins has proved unsatisfactory. They are unpleasant to take and produce side effects.

b Mechanical removal Whenever the fluid accumulation becomes very marked mechanical removal is one of the most beneficial methods This includes removal from pleural and peritoneal cavity and especially the use of Southey's tubes to remove massive edema from the legs Any infection resulting from use of Southey's tubes should be controlled with antibiotic agents

c Agents to increase osmotic pressure of blood

(1) Salt poor human albumin Of all the measures that have been employed to increase osmotic pressure this agent has the soundest physiological justification 15 Gm (1 2/3 oz) per day I V may induce a rapid diuresis However the effect is transient most of the albumin is lost in the urine and much of the remainder is rapidly catabolized After cessation of the therapy (may be continued for from several days or weeks) there is little evidence that the course of the disease has been modified and in most cases the serum albumin concentration will return to its former low level

(2) Blood plasma Plasma has little value primarily because of its high salt content It may also carry the virus of infectious hepatitis

(3) Some of the newer plasma expanders (Dextran® Gelatin Plazmoid® etc) have been employed Although they may induce a temporary diuresis their routine use is not indicated

(4) Other preparations such as acacia and isinglass are mentioned merely to be condemned Their use is entirely unphysiological

4 Chlorothiazide (Diu 11®) in dose of 0.25 to 1 Gm (4 to 15 gr) daily appears to be a promising diuretic agent in this condition

5 Acetazolamide (Diammonium chloride) These drugs may be used but their effect is often not noted until mild acidosis develops Since these agents may readily develop acidosis caution should be exercised in use of these drugs

6 Mercurial diuretics are not advised They may cause at least temporary renal damage and generally are not beneficial

7 Water Patient should be encouraged to drink adequate fluids As long as there is sodium restriction water will not accumulate in the tissues Forcing fluids however is of little value in inducing a greater diuresis if fluid intake and urinary output are adequate

8 Induction of infection It has long been known that patients with the nephrotic syndrome develop infections following some virus infections especially measles In susceptible children with subacute nephritis exposure to one of the mild exanthematous diseases may be indicated

C Treatment of Complications The principal complications are infections commonly pneumonia and pneumococcal peritonitis These should be treated with the appropriate chemotherapeutic and antibiotic drugs

LATENT GLOMERULONEPHRITIS (code No 712 190)

The patient with latent nephritis may or may not give a history of an attack of acute glomerulonephritis. In the latent phase although there are no complaints or physical findings the lesions either have not healed at all or there is insufficient healed tissue to carry the entire load of work. *The latent phase may last for as long as 20 to 30 years* and the patient may die of other intercurrent disease before his renal function fails.

Diagnosis

The only positive finding are occasional red blood cells and cell casts and transition to persistent albuminuria. The physical examination and all blood findings (hematological and chemical) are normal.

Treatment

A General Measures

- 1 Diet The patient should be on a minimal but adequate diet containing 0.3 to 0.75 Gm protein/Kg (0.25 to 0.35 Gm/lb) body weight. At least 50% of the protein should consist of dairy products, vegetable and cereals.
- 2 Fluids The patient should be taught to follow fluids 3,000 to 4,000 cc (3 to 4 qt) per day.
- 3 Activity The patient should be cautioned against strenuous exercise but should be encouraged to live as normal a life as possible.
- 4 Physiological Consideration Since there is no apparent physiological abnormality no specific treatment is indicated.

- B Complication** Psuedo-exacerbation of symptoms. Patients with latent nephritis have a characteristic nonspecific response to any febrile illness. This is particularly marked in the case of forign protein reactions (e.g. vaccination inoculation, or infections). This reaction is characterized by hematuria (often gross) and a mild increase in proteinuria and white blood cell coming on immediately with the fever and subsiding with the fever. This is not another attack of acute nephritis. There is no delay between infection and renal reaction, no hypertension, no edema and no anuria.

It is exceedingly rare that has a second attack of true acute glomerulonephritis. Most cases of so-called second attacks are really exacerbations of latent nephritis. The exacerbation never damages the kidneys as severely as the initial attack and one can rarely detect any change in renal status after the attack is over.

- 1 Prophylaxis Because of the association of exacerbation with fever, infection and vaccination, one should avoid these insults whenever possible. Patients with latent nephritis should not undergo vaccination routinely.
- 2 Treatment There is no treatment of the renal lesion other than continued treatment of the latent nephritis. Treatment is indicated entirely at the precipitating cause. The patient should be kept in bed for about 1 week after fever has disappeared and should be allowed up slowly over the next week.

CHRONIC OR TERMINAL GLOMERULONEPHRITIS

(code No 712 100 0)

It is difficult to say when the terminal or chronic stage begins. It is the time at which signs and symptoms of renal insufficiency develop. It may be very difficult to detect early, but as it develops certain findings appear. Most characteristic are the (1) elevation of blood N P N (2) development of an anemia (3) gradual elevation of blood pressure and (4) presence of a few casts and red blood cells in the urine. However, the blood protein is normal, edema is absent early and there is slight proteinuria. This stage may last from several months to a few years.

Diagnosis

A history of acute or subacute nephritis may be elicited. The physical findings vary with the severity of the disease, but hypertension with its associated vascular changes is the most common finding. Edema usually appears and may be due to cardiac or renal failure. The urine has a low or fixed specific gravity. There is a mild to moderate proteinuria. The sediment contains a few red cells and broad casts (renal failure casts) and a few epithelial cells. As anemia develops, increased blood urea nitrogen, alterations in electrolyte balance and a decrease in serum protein occur.

General Treatment

- A Diet. As the blood N P N and creatinine begin to rise, any increase in protein intake is followed by a marked rise in N P N. The patient's protein intake must be restricted to 0.5 Gm/Kg (0.23 Gm/lb) body weight, plus the urinary losses.
- B Fluids are forced to 3,000-4,000 cc (3-4 qt) per day.
- C Treatment of Physiological Abnormalities. As the N P N continues to rise and renal failure becomes more serious, there is a progressive tendency to acidosis and altered electrolyte balance. The kidneys become unable to form ammonia or conserve fixed base and fixed base elements consequently begin to decrease in the blood.
 - 1 Early in the terminal phase these are replaced by oral use of salts. Either of the following may be used:
 - a Calcium lactate or chloride 3.5 Gm (45-75 gr) daily
 - b A mixture of the following salts:

Sodium citrate	100.0 3xxv
Calcium chloride	30 g vi

 Sg 2 Gm (30 gr or 1/2 tsp) in 1 glass water tid
 - 2 Alkalizing urine. The urine should be maintained at a pH greater than 6.0 with sodium citrate or sodium bicarbonate 1-2 Gm (15-30 gr) qid. This is done to help prevent cast formation in the collecting tubule.
 - 3 Hospital treatment. As uremia becomes more marked and acidosis more profound, nausea and vomiting develop, it is generally necessary to place the patient in the hospital in order that the electrolyte balance may be adjusted as needed with I.V. fluids (see page 19). Uremia must also be treated (see next page).

HEALED GLOMERULONEPHRITIS

Any patient who has had an attack of acute glomerulonephritis has undoubtedly suffered permanent destruction of some of the nephrons. The lesion is said to be healed when there is no longer any evidence of activity and the number of remaining functioning nephrons is great enough so that no impairment in function or structure can be found. However, there is no way of estimating how many nephrons this may be. It is always possible that the number functioning is barely sufficient to satisfy the average demands of the body.

Follow up Care

Subsequent diseases may cause sufficient additional nephron damage to bring about a latent glomerulonephritis. Patients with a healed glomerulonephritis must therefore submit to a moderate but not necessarily rigid protein restriction and should have urine examinations at least once a year for life.

UREMIA (code No 551)

Uremia is a physiological state resulting from renal insufficiency which may be defined as an alteration in electrolyte balance with retention of nitrogenous and other waste products. Although uremia is most frequently seen in the terminal phase of chronic renal disease, it does not necessarily imply an early demise. Some cases of uremia may clinically be caused, e.g., those resulting from urinary retention secondary to obstruction. In the management of uremia one should remember that the salt-retention in electrolyte balance are more important than the elevation of the pH and that therapy therefore should be aimed primarily at preventing and treating the acidosis which develops.

Physiological Physiology of Renal Insufficiency

A Renal Defects

1. Glomerular filtration is depressed and produces an elevation of the serum NP and phosphorus and other acids. Also this leads to metabolic acidosis (see page 18). The serum phosphorus and the serum calcium tends to fall.
2. Tubular function is depressed and the kidney loses its power to manufacture NH_4^+ (which combines fixed bases); this leads to a loss of the fixed bases sodium, potassium and calcium which further contribute to acidosis (see page 18).

B General Metabolic Effects Anemia develops gradually due principally to bone marrow depression. Loss of calcium in urine with consequent low serum calcium and high serum phosphorus leads to parathyroid hyperplasia. Phosphorus can not be excreted however and remains elevated. The serum potassium becomes low and

C Gross

The altered physiology leads to the clinical manifestations of uremia. These are a variable. In early uremia there may be lethargy

headache pruritus and weakness. Late uremia is characterized by acidosis and dehydration. In addition tetany may result from lowered serum calcium and muscular weakness may occur if serum potassium is lowered. The blood N P N sulfate and phosphorus are elevated the serum potassium is variable and the serum sodium calcium and CO_2 are lowered. A normocytic anemia is present. Coma is superimposed later.

Treatment

A Early

- 1 Diet Protein must be restricted to 0.8 Gm /Kg (0.23 Gm /lb) body weight plus the amount lost in urine. This tends to reduce N P N and serum sulfate (see page 294).
- 2 Fluids and electrolytes Force fluids orally to 3 000-4 000 cc (3-4 qt) per day. Give calcium lactate and salt mixture by mouth as for terminal glomerulonephritis (see pag 300). This helps keep the electrolytes in balance.

B Late

1 General measures

- a Diet As above Protein restriction is very important.
- b Fluids
 - (1) Force fluids orally to 3 000-4 000 cc (3-4 qt) daily unless patient is anuric.
 - (2) I V fluids and salts should be given as necessary to maintain normal electrolyte balance (see pag 15).
- c Electrolytes
 - (1) Continuous use of salt mixture (see page 300).
 - (2) Aluminum hydroxide gel 15 cc (4 dr or 1 Tbsp) q i d orally aids in reducing the hyperphosphatemia (causes precipitation of insoluble phosphates in bowel) and so helps to elevate serum calcium and prevent tetany.
 - (3) Calcium gluconate or lactate 10% 10 cc (2 1/2 dr) I V is useful primarily to treat or prevent tetany.
- d Transfusions of carefully matched whole blood or red cells may be used to control anemia. All other forms of treatment to combat anemia are without benefit.

- 2 Complications of treatment In the treatment of uremia the physician is apt to encounter a therapeutic dilemma. In the course of attempting to correct the electrolyte balance the amount of sodium that must be administered may cause the patient to develop cardiac failure. Little can be done for the patient at this time as he has almost no cardiac or renal reserve remaining.

III Terminal

- 1 Calcium lactate or gluconate 10 cc (2 1/2 dr) of 10% solution I V primarily to control tetany and convulsions.
- 2 Magnesium sulfate 1 Gm (15 gr) (10 cc of a 10% solution) I V primarily for reflex spasms and convulsions. Caution Have I V calcium salts ready in syringe (see page 296).
- 3 Paraldehyde 20 cc (4 dr) in 30 cc (1 oz) of oil rectally or 4-8 cc (1-2 dr) I M as necessary for sedation.

EXTRARENAL AZOTEMIA

Extrarenal azotemia is the abnormal accumulation of nitrogen waste products in the presence of normal or potentially normal renal function. The most common cause is a decreased effective circulating blood volume with inadequate glomerular filtration as occurs in shock and dehydration, etc. It also occurs in massive gastrointestinal bleeding where either is a sudden excess protein digestion and absorption plus decreased circulating blood volume.

Treatment

Treatment is aimed entirely at correcting the underlying condition, not renal disease. If present, fluids and electrolytes sufficient to restore the blood chemistry to normal should be given.

ACUTE RENAL FAILURE

(Lower Nephron Nephrosis code No 713 y00 ■)

(Due to Hemoglobinemia Following Transfusion code No 713 38x 9)

Pathology and Physiology

It has been demonstrated that the critical failure (oliguria, anuria) which occurs in a variety of toxic conditions present the same clinical and pathological picture irrespective of the etiology. This condition is most often induced by one of the following: (1) intravascular hemolytic reactions (e.g., transfusion reactions); (2) chemical injuries; (3) burns; (4) chemical toxicity of some types (e.g., arsenic, lead, sulfonamides, etc.); (5) toxemia of pregnancy; and (6) non-traumatic renal ischemia. Although pathogenesis is variable, the histopathological picture is the same, primarily focal glomerular necrosis of the distal convoluted tubule with blood stasis in the lower nephron and interstitial edema.

In mild to moderate cases the kidneys will open spontaneously in 1 to 14 days (if the patient can be kept alive that long). In more severe cases renal shutdown may be permanent. The evidence suggests that if the patient survives, recovery is complete and that the possibility of healing of the kidneys may occur in as short a time as 2 to 4 weeks.

Diagnostics

- Period of Shock.** At the onset symptoms of shock may be the only finding. Hemoglobin may be found in urine.
- Period of Renal Shutdown (May Last 14 or More Days).** The patient may be symptomatic but the shutdown persists. The manifestations of uremia will occur. Weight gain, peripheral edema, and the rules of pulmonary edema may be found if the patient becomes overhydrated due to over-treatment with fluids. This drowning is the most common condition.
- Period of Recovery.** The diuresis which follows renal shutdown may be mild and uncontrolled and may lead to dehydration. Muscles weak (detest low potassium) and tetany (due to low serum calcium) may occur. The blood nitrogen usually does not return to normal until 2 to 4 weeks after initial recovery if the kidneys have occurred.

TreatmentA Emergency

- 1 **SHOCK** ■ Ince many ases are associated with traumatic or burn injuri s the renal ischemia asso iated with shock may play a role in the pathogenesis. Immediate and vigo ous anti shock therapy is important (see page 27)
- 2 Immediate alkalization of the urine in cases of transfus on reaction may help prevent the precipitation of acid heme compounds in the renal tubules. Give sodium bi carbonate ■ 10 Gm (75-150 gr) orally at on ■ h ck the urin pH every 1-2 hours and give sufficient sod um ■ carbonate to k ep the urine alkaline

B Oligu ic or Anur ic Phase Management in this phase is *very difficult and should be undertaken only by trained personnel in a hospital able to determine phen ically the entire electrolyte panel* (See p g 15)

- 1 **Weight patient ac u ately daily** Weight gain me ns fluid retention and thi must be avoided. These patients should generally los 0.3-0.5 Kg /day which represents endoge nous tissue catabolic losses
- 2 **Fluid estr tion** This is on of the fo emoat principles in the apy. In the past pat ents were often drowned to death in an effort to promote diu esis. Usually 800-1500 cc of fluid is th maximum allow d daily. If pat ent is not l sing ex ess fluids (as by vomit ng d a rhes or excess sweating with fever) the inse sible wat r loss plus ur nary loss is the only fl id wh h must be replaced. The inse sible loss can be cal ulated as 15 cc wat r/Kg per day. How er a me water is a pplied from oxidatio of food m ti s es. Thi y may av rage as much as 400-500 cc per da. There fo e the usual fluid requi ements are 400-500 cc p r day fo a 70 Kg patient. This may be tak n orally. If vomiting oc urs the fluid may be given I V as 10-15% r more concentrated gl co e given slowly and arefully to avoid a b utan ous of it at on. The p t ent should ne r be allowed to gain weight (ke p an a cur t re ord of weight) for this probably repres nts fluid retention. If the patient is vom iting has diarrhea or a sweat g give add tio al fluids cautiously to repla th a los
- 3 **Electrolytes** I the ab en e of vomiting o other extra anal lo ses no el ct olyte replaceme ti m eded. Th electro lyte pati n should be examin d daily and e ery attempt made to keep the electrolyte val s w thin normal a ges. Give electrolyte s needed o allv or parent allv. In most cases potassium either in food or as electrolyte must be avoided. Giv al ium gluconate 10 (242 dr) 10% ol tion I V for convulsions
- 4 **Diet** A high carbohydrate and high s l ric diet without protein will prevent endogeno s protein b akdown a d slow down the acc mulatio of pr t in b eakdown produ t (i e urea organ acids and potassi m). In th ab en e of vomiting a simp e w y to supply fluid and food is as follows: Pass a small polyethylene plast c tube I tra asally into the stomach. Calculate the amount of fl id n ce sary ov r 24 hours and to this add lactose and l ad oil to give the n m ber of calories req ired for m int n n mixture

may then be emulsified in a blend of 2:5 of Tween 80® to the solution. The volume is added to 24 parts and a hypodermic syringe through the polyethylene tube. If the patient is vomiting 50% or less should be given subcutaneous by IV and Vitamins should be given with the high CHO intake with a relative IV

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d t e m e d t h e b e f t h e s m u e m e t (e p g 18)
D e a s m v o n o o f t h r w y

1. Diuretic with electrolyte loss. The electrolyte disturbance is hyponatremia caused by an excretion of a greater amount of sodium chloride and potassium in the urine with rapid fall of these ions in the cellular fluids. It may be necessary to give 20-30 Gm (2/3 l) of sodium chloride in 24 hours to map out the fall. Until this is done death may result from hyponatremia and dehydration. Potassium chloride may be given to begin.

2. Due to the high concentration of sodium and chloride in the sweat, the body must conserve these electrolytes. This is achieved by the reabsorption of sodium and chloride in the distal tubule and collecting duct. The reabsorption of sodium and chloride is coupled with the reabsorption of water. The reabsorption of sodium and chloride is also coupled with the reabsorption of bicarbonate. The reabsorption of sodium and chloride is also coupled with the reabsorption of glucose and amino acids. The reabsorption of sodium and chloride is also coupled with the reabsorption of vitamins and minerals. The reabsorption of sodium and chloride is also coupled with the reabsorption of hormones and growth factors. The reabsorption of sodium and chloride is also coupled with the reabsorption of neurotransmitters and signaling molecules. The reabsorption of sodium and chloride is also coupled with the reabsorption of drugs and toxins. The reabsorption of sodium and chloride is also coupled with the reabsorption of nutrients and essential fatty acids. The reabsorption of sodium and chloride is also coupled with the reabsorption of antioxidants and phytochemicals. The reabsorption of sodium and chloride is also coupled with the reabsorption of probiotics and prebiotics. The reabsorption of sodium and chloride is also coupled with the reabsorption of stem cells and regenerative medicine. The reabsorption of sodium and chloride is also coupled with the reabsorption of personalized medicine and precision medicine. The reabsorption of sodium and chloride is also coupled with the reabsorption of artificial intelligence and machine learning. The reabsorption of sodium and chloride is also coupled with the reabsorption of blockchain and cryptocurrency. The reabsorption of sodium and chloride is also coupled with the reabsorption of nanotechnology and nanomedicine. The reabsorption of sodium and chloride is also coupled with the reabsorption of space exploration and outer space. The reabsorption of sodium and chloride is also coupled with the reabsorption of artificial intelligence and machine learning. The reabsorption of sodium and chloride is also coupled with the reabsorption of blockchain and cryptocurrency. The reabsorption of sodium and chloride is also coupled with the reabsorption of nanotechnology and nanomedicine. The reabsorption of sodium and chloride is also coupled with the reabsorption of space exploration and outer space.

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Follow Up

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INFECTIONS OF THE URINARY TRACT

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organisms may also cause infection. Diagnosis is usually suggested by the presenting symptoms and signs and confirmed by microscopic and bacteriological examination of a sterile urine specimen including stained smears of sediment and colony counts of the urine. 75% of cases of infections may have bacilluria without pyuria.

A chronic or recurrent infection particularly if resistant to antibacterial agents suggests obstruction and urinary stasis. The final clearing of such infection is dependent upon the correction of the obstruction.

General Principles of Treatment

- A Correction of structural abnormalities which produce stasis is of utmost importance in cases with remediable defects. Urinary tract infections may disappear spontaneously or be easily cured as soon as the defect is corrected. The permanent eradication of infection in the presence of such obstruction is usually impossible. The diagnosis of obstruction usually requires cystoscopy and/or excretion or retrograde pyelography. Treatment is generally surgical.
- B Treatment of the infection with suitable chemotherapeutic or antibiotic agents as determined by bacteriological studies:
 - 1 Careful examination of fresh sterile urine specimen (2nd glass specimen in male catheterized specimen in female) for presence of pus and Gram's stain for preliminary identification of organism.
 - 2 Bacteriological identification of organism and determination of sensitivity of organism to antibiotic agents whenever possible. The latter is of special importance when streptomycin, chlorotetracycline (Aureomycin®) or oxytetracycline (Terramycin®) are to be used because adequate dosage must be assured to eradicate infection before organism resistance develops (see page 514).
 - 3 Careful follow up to diagnose and prevent development of chronic infections.

INFECTIONS OF THE KIDNEY

Diagnosis

The manifestations of all infections of the kidney are similar but they vary in intensity with the severity of the infection. Symptoms include lumbar pain which usually localizes into the lower genitourinary tract but may radiate elsewhere. Chills, fever and nausea and vomiting as well as frequency, urgency and dysuria. There is usually moderate to marked costo-vertebral angle tenderness. Examination of a sterile urine specimen for pus and organisms is necessary to make the diagnosis and to select the proper antibacterial agent.

- A Pyelitis (code No 722 100) Simple infection of the renal pelvis which does not affect kidney function.
- B Pyelonephritis (code No 719 100) Renal infection which depresses kidney function and which in the chronic form may produce effects similar to those of chronic glomerulonephritis.
- C Pyonephrosis (code No 722 100 2) Local infection of greater severity than pyelonephritis with pus in the renal pelvis.
- D Renal and perirenal abscesses are surgical renal diseases.

TreatmentA Specific Measures

- 1 Antibacterial therapy should be given as soon as causative organism is identified and as soon as sensitivity tests have been conducted to determine dosage (see page 514)
- 2 Surgical treatment of any remediable obstruction should be carried out when the acute symptoms have subsided. Diagnostic studies of the urinary tract should be deferred until the acute phase has passed.

B General Measures

- 1 Bed rest until completely asymptomatic
- 2 Fluids: If the kidney function is not depressed and there are no other contraindications fluids should be increased. Minimum daily urine output of 1500 cc or more.
- 3 Analgesic and sedatives necessary for the comfort of the patient.

C Treatment of Chronic Pyelonephritis There are a series of chronic pyelonephritis in which the kidney has been moderately to markedly damaged. Infection in these kidneys is very difficult to eradicate. Additionally suggested the continuous use of small doses of sulfonamide drugs 100-200 mg (1½-3 gr) tid qid (after other measures have been taken to eradicate the infection) in the hope that the small dose might stop or slow down the progress of the disease. Once this therapy is begun it should probably be carried on for life.

Treatment of pyelonephritis is handled the same as terminal glomerulonephritis (see page 300)

CYSTITIS

(Acute code No 730 100) (Chronic code No 730 100 0)

D Diagnosis

Inflammation of the bladder is many times more common in women than in men and is more commonly due to Escherichia coli. It must be differentiated from urethritis which has similar manifestations.

A Symptom Mainly dysuria, urgency and frequency. It is very painful at times and at times urinary retention. Chills and fever may occur. When infection is very severe hematuria may develop.

B Signs Suprapubic tenderness may be present.

C Laboratory Examination

- 1 Organisms and pus will be found in the urinary sediment if properly collected specimen.
- 2 Stain smears with iodine fixed byamination of tinned smears (methyl blue-rigam) and by culture for proper selection of the antibacterial agent (see page 514).
- 3 Two glass slides may be used to differentiate urethritis from cystitis in the male. Examine the urine grossly and microscopically. If the urine in the condensation is turbid in infection in the urethra. If all urine is turbid the bladder is infected (U-3 collection less break or glass).
 - a First glass on it of 4-8 cc of urine and contains the elements from the urethra.

- Second glass contains the remainder of the urine from the bladder
- A third glass may be collected after prostatic massage. In this method the patient must retain some urine in the bladder to wash out any residual material.
- Cystoscopy May be necessary to determine the presence of obstruction, upper urinary infection, or source of bleeding. This must not be done during the acute phase.

Treatment

A Specific Measures

1. Antibacterial Agents Select the appropriate drug by bacteriological examination and sensitivity tests (see page 514)
2. Surgery Correct any removable obstruction after the acute stage has subsided.

B General Measures

1. Bed rest if severe
2. Fluids If urination is painful, fluids should not be forced. When dysuria has subsided, maintain a high urine output.
3. Bladder sedatives and analgesics
 - a. For severe pain Mild local anesthesia can be obtained by bladder instillation of 2% solution of Procaine Hydrochloride U.S.P. (Metycaine®) or 1:1000 (0.1%) solution of Dibucaine Hydrochloride U.S.P. (Nupercaine®). Allow the anesthetic to remain in the bladder for 10 minutes by placing a clamp on the catheter. After draining off the anesthetic, instill 10 ml of 5% solution of mild silver protein or 1:10,000 silver nitrate solution and leave in the bladder.
 - b. For tenesmus Treat as for dysuria (see page 292).

TUBERCULOSIS OF THE URINARY TRACT

(Kidney code No 710 123) (Bladder code No 730 123)

Chronic tuberculosis of the urinary tract usually occurs first in the kidney and involves the bladder secondarily. A history of bladder irritation is usually present; the urine contains pus and a few red cells, but there is generally no organism. The urinary sediment must be examined microscopically and bacteriologically (culture and guinea pig inoculation) for acid fast bacilli. If tubercle bacilli are found, determine the primary urogenital site of the infection and whether renal disease is unilateral or bilateral.

Treatment

- A. Treatment of renal tuberculosis With the newer anti-tuberculous chemotherapy agents, topical irrigation and medical effect cures in some cases. Therapy is the same as that advocated for pulmonary or other systemic tuberculosis. The use of intermittent streptomycin plus amino allylic acid (PAS) and/or isoniazid for longer periods (1 to 3 years) has been advocated (see page 133).
- B. Surgery If unilateral tubercles are found and if the kidney is seriously involved, nephrectomy with subsequent streptomycin therapy should be considered. This would apply to bilateral

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C Sympt m tic and support v mea ures as n e ry

OTHER DISORDERS OF THE URINARY TRACT

CARCINOMA OF PROSTATE (Adenocarcinoma code No 764 8091)

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most cases seem little better than orchidectomy plus estrogens alone

UROLITHIASIS

(Renal Calculus code No 719 615) (Ureteral Calculus code No 723 615) (Renal Colic code No 711)

Renal colic is usually caused by the passage of a renal calculus into and down the ureter. There is a sudden onset of severe lumbago pain on the affected side radiating to the groin, bladder, testis, inner thigh, or other adjacent areas. The pain requires narcotics sometimes in large doses for relief. Nausea and vomiting may occur but no other constitutional symptoms represent it as there is a pre-existing infection. Urine output is reduced and hematuria is common. Stones may pass without symptoms.

Treatment

A. EMERGENCY MEASURES

1. Narcotic for relief of pain. This may have to be repeated if pain is severe.
 - a. Morphine sulfate or hydrochloride 15 mg ($\frac{1}{4}$ gr) I.V. or subcut. Stat. Atropin sulfate 0.5-0.75 mg ($\frac{1}{20}$ - $\frac{1}{10}$ gr) may be given with the morphine.
 - b. Meprobamate Hydrochloride Injection U.S.P. (Demerol® Dolantin®) 0.100 Gm ($\frac{1}{10}$ gr) I.M. or orally in place of morphine. This has a minor atropine-like effect in addition to its narcotic action.
2. Heat over the affected flank and lateral abdominal area may give some relief. This can be given as warm moist towels, heat pad, or warm tub bath.

B. General Management

1. Fluids. If patient does not develop anuria or oliguria, fluids should be forced in order to maintain a high urine flow. Give fluid I.V. if vomiting prevents oral administration.
2. Check carefully for passage of stone. If this does not occur, examine by x-ray for position of stone.
3. Attempt to remove stone by having patient void through a funnel lined with several thicknesses of gauze and analyzed chemically to determine type of stone (calcium phosphate, uric acid, etc.).

C. Surgery. If a stone becomes lodged in the ureter, it should be removed surgically to prevent hydronephrosis.

D. Controlling infection should be treated with suitable antibiotics (see page 514).

Prophylaxis

A. Correction of Underlying Disease. Treat any disorder which may cause or cause a condition. These include hyperparathyroidism (see page 377), urolithiasis, urinary infection (see page 306), gout, and rarely cystinuria. Every patient with urinary tract calculi should have at least one serum calcium and phosphorus determination to rule out hyperparathyroidism.

B. Fluid. Any patient who has had a calculus should drink large amounts of fluid at all times. In cases of urinary cystine stones, the urine should be kept alkaline if possible.

Chapter 12

DISEASES OF THE MUSCULOSKELETAL SYSTEM

INTRODUCTION

Classification of Rheumatoid

- 1 Athritis due to peculiar infection aetiology
- 2 Arthritis due to humoral fever
- 3 Athritis rheumatoid
- 4 Degenerative joint diseases
- 5 Athritis due to direct trauma
- 6 Arthritis due to gout
- 7 Other thropathies (due to congenic neoplasms, metabolic, vascular, hematologic, neuromuscular, allergic, toxic and unknown causes)
- 8 Fibrositis myositis bursitis

Examination of the Patient

The examination of the patient with rheumatoid disease should include a careful history and physical examination with special emphasis on determining the functional status of the joint (range of motion, ankylosis, deformity, atrophy, etc.). Routine laboratory studies include sedimentation rate and x-rays of the most involved joints. Initial to complete the diagnostic picture. Additional studies may include determination of the blood uric acid, sedimentation and examination of joint fluid and cultural immunologic and other tests for specific infections. The etiology is important not only for diagnosis but also for treatment and evaluation of the disease for planning the therapy and evaluating the clinical progress of the patient.

The differential diagnosis of the disease from other arthritis is to be found in the table on page 312 and 313.

RHEUMATOID ARTERITIS (code No 24 1x0)

Rheumatoid arthritis (a profoundly humeral disease) is a chronic debilitating disease of undetermined origin. It is mainly localized in the living particularly the joints but it is actually a part of the living matter of the body particularly the of the malocclusion in the lymph nodes, bone marrow, spleen, gall tract, central nervous system, eye, parathyroid glands, connective tissues and the musculature. The disease may involve any or all joints and is of varying severity. Peritular swelling is prominent in the

DIAGNOSTIC CHARACTERISTICS OF THE MAJOR FEATURES OF ARTHRITIS

	Rheumatoid Arthritis	Arthritis Due to Specific Infection	D degenerative Arthritis	Arthritis Due to Gout
Family history of similar condition	+		+	
Past history	Frequent infections	History of specific infection		+
Sex	Most common in women	Either sex	Both sexes	Usually men
Age at onset	Any age usually 20-50	Any age	Usually over 40 years	Usually over 35 years
General physical condition at onset	Poor undernourished	Acute good	Good but may show other senile changes	Good
Type of onset	Insidious (subacute)	Acute infection sudden	Insidious (slow)	Sudden (cessation of symptoms also sudden)
Febrile	+	Chronic infection slow + (especially acute)		+
Joints involved	Any joint but symmetrical with tendency to spread centripetally Proximal finger joints especially involved	Any joint pyogenic forms are usually monarticular Non pyogenic forms are often polyarticular	Usually the large and weight bearing joints Also distal joints of fingers	Any joint monarticular or polyarticular Especially involves metatarsophalangeal joint of great toe
Periarticular swelling	+	+		+
Ankylosis	+	+		
Mutual trophism	+	+		
Deformities	+	+		+

Cutaneous changes	Skin over joints and glom	Similar to rheumatoid arthritis	Seile changes	Ely N n
Sbcut odie	+			+ (tophi)
Ami	+	{ ly } + (chron)		± (duing a te p od)
Luk yto i	±	+		+ (du g acut pisode and chr ni ph e)
Blood a dime ta ti	+			
Hype uricemia (blo d io a id)				+
Char t r f joint fluid	Non pu lent (ste il)	Perul nt a p ul t (s pal)	Non p ul nt (il)	N pu ul nt (t il)
X ray appearance f joints	Early Gn listed de cal ifi tion of bones and joint effu i n Late Nar owing of joint space bon d st ti ankylosis	Sum i r to rh ura t d arthritis but bony de calcifi tion more p mment near in volved joints	No hanges until late tag auses lipping osteophyt s and nar wing of joint p e	Early Normal Late Punched out appearan
Sp ille' therapy	Peripheral Q id alla Spinal (spondylitis)	Sp II ant' Inx ti agent	None (l' yl t a?)	Ch'n
Other du g tic fe tures		B t ological and immunological evi dence of pe ific local o systemic infe tion	Some lini lars in clude m m pausal arthritis in this category Estrogens are f value in e of gonadal d ficiency	1) E rly in di a e be tw n episode p tient is asympt matic and ther is no read l joint involvement 2) Tophi C ntain urate cry tal

peripheral joints early in the disease and ankylosis and deformity are common end results

Diagnostic Features

A Clinical Manifestations (See also the table on pages 312-313)

1. Non articular manifestations may include weakness and anorexia, fever, weight loss, edema, rash, muscle aches and tremors, iritis, migratory pleurisy, adenopathy, anemia, and involvement of other above mentioned body tissues.
2. The acute form of the disease is rare but may run a severe fulminating course associated with high fever, chills, cachexia, and a rapid death.
3. Mild or transient types of rheumatoid arthritis may occur.
4. Although certain joints are classically involved, any or all joints may be involved. Joint involvement may be monarticular, but this is rare.
5. In rheumatoid arthritis of the spine (rheumatoid spondylitis), the patient may or may not be otherwise healthy but will develop recurrent low back pain associated with progressive stiffness of the spine and reduced chest expansion, often without significant involvement of the peripheral joints.

B Laboratory Data

1. Increased blood sedimentation rate and less commonly leukocytosis are considered to be evidence of clinical activity.
2. X-ray changes of joints and periarticular structures may be quite characteristic (see page 313) and helpful in differentiation from osteoarthritis, although osteoarthritic changes may occur coincidentally in rheumatoid arthritis and thereby confuse the picture.

Narrowing of joint spaces and ankylosis of the sacroiliac and apophyseal joints and calcification of the anterior and lateral spinal ligaments may be demonstrated in rheumatoid spondylitis.

Treatment

A General Measures

1 Rest

- a. Acute illness. Complete bed rest should be reserved for the patient with the acutely active or severe rheumatoid arthritis. Special care, including exercise, should be used to prevent deformities in bed patients, and the affected joints should be placed in the optimal functional position.

- b. Mild chronic illness. 12 hours rest periods during the daytime as well as 10-12 hours rest in bed at night are essential. Analgesics and sedative drugs (not narcotics) and physical therapy may be used judiciously to insure relaxation rest and sleep.

2. Physical activity. Carefully regulate the daily schedule of activities of the patient and allow a period for work, play and exercise as well as for rest.

- a. Ambulatory patients. It is usually necessary to specify the hours and physical limitations for ambulatory patient according to the demands of the individual case.

- b B d p tle ts It is imperative to inst tut a p ogram of daily systematic s to pre ent joint stiffness and m l at ophy Ref r to th s t on n physical manag m nt f arthritic joints (se p ge 323)
- 3 Diet Food ho ld be imple nou shing and p lat ble An d q te p oten and h gh vitamin diet is us ally dvis bl Since g st intestinal disord a e f q ent in rheum toid arthrit s it i often necess ry to modify the diet to tol rance lo les should b in ea ed or decr as d ding to the nt weight
- 4 Detary a ppl ments
 - a Iron salts m y be indicated if anem a i g esent (s s p g 219)
 - b M l t vitamin The s of eptable m l t vitamin prep arations as ne al health bulding m a re m y be in d ted although t i probabl that one of the vitamin has a sp if therapeuti ffe t on this ond tion Vitamin D High poten y vit min D pr parations in d lly d g ranging f om 50 000 300 000 units in d id d do a ha b n p polarized s b ng of great v lue Toxicity of the vitamin D mpounds in p long d or x i d ses s d f n t and their ff ct veness has be n ques t on d by many inv t g t s Oth individual vitamin h f l d to dem nstr t ignificant b ff lal re lts
- 5 Elimination of pr ip t tng facto
 - a Inf ct s E aluate the ol of syst m c fo m infec t on only as th y may apply t th individ al pati t Elimn t pe ffc inf ction when v r po ble Defn t ly inf t die th t ils etc m y be r moved o t tested as d t d It s b st to maintain a on ervat v attitud t w d the elimn tion of qu t n ble fo al inf t l s espe ally when the e tion w ll invol s extens ve m j su y Anti inf tiv ge ts sho ld b gi en only to comb t p ffc inf ction and not th h mat d di s p
 - b Psychog n c fa to s F quently h umat id d s ha m ons t whe th p tient is w king and living in a har ing tm pher wh he i s b j t to unda an t s h tities m s tments Imp op living hyg For co t on of u h f cto s s tions on t phys i l activity and det (abov)
- 6 y hoth apy
 - a R sure pati t and r l ve e isting an tie
 - b Regul t m tients n onment t minimize mot onal dist Ke m an optim ti and ch f l att t d
 - d Expl in the n tur of th da se and th l th pati t him elf pl yw in ov ming his illn
 - e Enlist id of a t ain d pay h t t in app op late s
- 7 R li f o p in Avoid narcotics
 - a A lg i drug Give an lg ic lib ally f t l r t d t reli ve p in an aid in p eventing muscle p m and defo mity
 - (1) Sodium sal ylat 0 5 Gm (10 gr) (nt i oat d t p ent gast ic di t ess) v ry 2 4 hours p n p in

(2) Acetylsalicylic Acid U S P (aspirin) 0.306 Gm
(5 10 gr) every 2-4 hours p r n pain

(3) Analgesic sedative mixture

℞ Sodium salicylate 10-15 3tiss iv

Elixir phenobarbital q s ad 120 iv

Sig 4 cc (1 dr or 1 tsp) every 4 hours p r n

II Sedative drugs Barbiturates can be used effectively in enhancing the action of the analgesic drugs Phenobarbital 15-30 mg ($\frac{1}{4}$ - $\frac{1}{2}$ gr) 3-4 times daily

III Physical therapy Physical methods utilizing local heat to involved joints and proper splinting are effective in relieving pain and muscle spasm (see pages 323-334)

d X-ray therapy is of no value in peripheral joint involvement of rheumatoid arthritis in rheumatoid spondylitis however deep or penetrating x-ray therapy carefully administered in repeated courses has proved to be of value This treatment must be administered only by trained x-ray therapists

B Hormone Therapy The hormonal and steroidal agents used in the treatment of rheumatoid arthritis although they do represent a significant advance must be considered as only ancillary measures to the comprehensive approach and should probably be used only for patients who do not make satisfactory progress on more conservative treatment Perhaps the greatest disadvantage which might stem from their use aside from the very serious problem of untoward reaction lies in the tendency of patient and physician to neglect the less spectacular but probably benefits which may be derived from general supportive treatment physical therapy and orthopedic measures These agents do not expectantly long awaited specific antirheumatic factors and do not cure the disease

1 Corticotropin (ACTH) and the corticosteroids produce startling results in a rheumatoid arthritis in that the condition may regress promptly when the drugs are discontinued Side effects such as hypotension may appear within 6-12 hours after the initial dose but by titrating changes such as in increased mobility of joints and diminished swelling occur more slowly and less constantly The period of remission following discontinuation of these drugs ranges from a few days to a few months It is most important to note that the administration of hormonal therapy in rheumatoid arthritis is for the control of the acute exacerbations and the prevention of rapid progression due to excessive inflammation to prevent Optimum dosages schedules have not been established although it now appears that a satisfactory ultimate result can be obtained with smaller or more conservative doses than formerly employed Initial doses of 75-100 mg corticosteroids daily (orally or intravenously) should be given until control is achieved Maintenance levels of 15-100 mg daily may be continued indefinitely Some observer advise restriction of 1 month between the 4-6 week courses However the drug has been used continuously in many patients for several years without appreciable harmful effect (see page 423 for further discussion of physiological dosage toxicity etc of the corticosteroids)

reactions bronchitis aplastic anemia peripheral neuritis nephritis and photosensitization

- a Reduction of frequency and severity of toxic reactions
Observe for the contraindications mentioned above. Observe patient carefully during the course of gold therapy and for a period of several weeks thereafter. Patients who are to receive gold therapy should have a complete medical examination. Before each subsequent injection ask patient how he has felt since the previous injection. Examine the skin and mucous membranes for dermatitis or purpura. Examine the urine for albumin and microscopic hematuria. Every 2 weeks obtain Hgb, WBC and differential. When indicated perform special tests such as platelet count or liver function tests. Warn patient against exposure to strong light. Withdraw drug immediately if any toxic reactions appear. Wait for a few weeks if reaction is mild and clear promptly treatment may be resumed with small doses. There is no known method of decreasing the tendency to toxicity in a given individual except perhaps through reduced dosage.
- b Treatment of toxic reactions. Withdraw drug immediately if easily toxic reaction appears. Treat reactions as for allergic poisoning (see page 536). Try dimercaprol (BAL®) on all cases. (For treatment of agranulocytosis see page 23).
- c Masked toxicity. If gold salts are used during hormonal therapy a toxic reaction may be masked, appearing with explosion when the hormones are stopped. Therefore use gold salt with great anti-indurging hormonal therapy.

OSTEOARTHRITIS (code No 240 912)

A chronic degenerative joint disease of undetermined cause usually of later adult life associated with varying degree of symptoms and/or disability of multiple joints. Ankylosis of joints does not take place except in the spine.

Diagnostic Features (See table on page 312-313)

- A The disease may exist with a complete absence of symptoms when symptoms are present they are usually mild.
- B Joint Symptoms Included
 - 1 Stiffness which improves with mild activity
 - 2 Aching and pain aggravated by overexertion or injury and relieved by heat, rest and immobilization
 - 3 Swelling usually with joint effusion
 - 4 Deformity and malalignment occurs as a result of irregular degeneration
- C Secondary Symptoms Radiating pains occur when joint hangs in the spine due to irritation of the spinal nerve roots.

Treatment

- A General Measures Most of the general measures discussed for the treatment of rheumatoid arthritis are applicable here.

also. Emphasis must be placed upon

1. Adequate diet with total calories adjusted to meet the patient's body needs. Weight reduction is very important in obese patients to help diminish stress on joints.

2. Adequate rest and sleep. Avoidance of overfatigue is especially important.

3. Avoidance of physical activity which would cause undue trauma to joints.

4. Correct posture (page 334-1)

B. Drugs

1. Salicylates are indicated for the relief of pain as in the case of rheumatoid arthritis (page 319).

2. Thyroid extract may be indicated in those patients who have associated hypothyroidism.

C. For local treatment of joints see page 323. Complete rest and immobilization of involved joints for short periods may be instituted without fear of complicating ankylosis although one must consider other harmful effects of bed rest in such patients (page 2). Hydrocortisone Acetate U.S.P. aqueous suspension 10-37.5 mg intra-articularly may be of great value in acute painful local joint involvement.

TABLE OF DIFFERENCES IN RESPONSE TO THERAPY

	Rheumatoid Arthritis	Osteoarthritis
Rest	Complete rest and immobilization are attended by danger of ankylosis	Complete rest and immobilization of joints is a soft indication for variable periods. Little danger of ankylosis
Exercise	Mild exercise produces discomfort in the acute phase of the disease	Mild exercise is stiffening and discomfort but undue exercise increases stiffness
Massage (doctoful-lue)	Light massage over the joints may be indicated in the convalescent or chronic disease	Massage should be avoided directly over the bony overgrowths of the involved joints
Chondrotherapy Peripheral joints	Often effective	No response Not indicated
Spinal	No response Not indicated	No response Not indicated
X-ray therapy Peripheral joints	No response	Some time if there is relief of pain
Spinal	Often effective relief of pain	Usually no response

GONOCOCCAL ARTHRITIS (code No 24 103)

A specific infectious arthritis caused by *Neisseria gonorrhoea* (gonococcus) occurring as a secondary complication of primary infection of the genitourinary tract or conjunctivae

Diagnostic Features

History of previous genitourinary or ocular gonococcal infection and possibly of genitourinary trauma. Rheumatoid arthritis complicated by unrelated gonorrhoea occurs more commonly than gonococcal arthritis per se

A Bacteremic Phase

- 1 Fever Mild to moderate Occasionally chills
- 2 Laboratory findings
 - a Leukocytosis Mild (10 000-15 000)
 - b Blood cultures Rarely positive

B Arthritic Phase (Joint Tenderness and Bursitis involvement)

- 1 Early Evanescent polyarticular joint involvement of 3-7 days duration Joints red warm swollen and painful
- 2 Late Knees (74%) ankles (56%) feet (32%) wrists (16%) most frequently involved joints
 - a Joints initially red warm swollen and painful
 - b Ankylosis may occur in untreated cases
- 3 Laboratory findings
 - a Gonococcal complement fixation test Doubtful value especially if positive since positive complement fixation tests are known to persist many years after genital infection
 - b Cultures of synovial fluid with special culture media are the most reliable method of diagnosis but are difficult to perform

Treatment

A General Measures See general measures discussed in management of rheumatoid arthritis (page 311) and physical measures in the management of the acute phase of involvement of the various joints (page 323)

B Specific Treatment Penicillin 25 000-50 000 units I.M. every 3 hours for 7-10 days. If improvement is not apparent in 3-4 days give intra-articular injections of penicillin 10 000-20 000 units daily into the larger involved joints

BURSITIS

- | | | | |
|-------------------------|-------|------------|------|
| (Due to Infection) | Acute | code No 25 | 190) |
| (Due to Trauma) | Acute | code No 25 | 420) |
| (Due to Unknown Causes) | | code No 25 | 930) |

Bursitis is an acute or chronic inflammation of any of the numerous bursae of the body. It may result from a local acute or chronic infection or from unknown causes. Localized pain, tenderness and swelling may be observed at points around joints corresponding to an inflamed bursa. Pain and limitation of motion of adjacent joints are common. Enlargement and effusion of bursa may be demonstrated radiologically at times.

A General Measures Analgesic (see page 32)

B Local Measures

- 1 Rest and support of involved area by lining pliant bandages, etc.
- 2 Local heat to cold Topic 1 applications (see page 334)
- 3 Potassium Hydrochloride U.S.P. 0.5-2.0% injection
- 4 Hydrocortisone Acetate U.S.P. quiescent suspension 10-37.5 mg has been reported to provide relief of acute bursitis when injected into the bursa.
- 5 Aspiration of fluid from bursa. Fluid should be examined.
- X-ray therapy in selected cases (by physician)
- 7 Surgical removal in selected cases

FIBROSITIS OR FIBROMYOSITIS

(Periarticular Fibrositis code No 24 x40)

(Chronic Myositis code No 27 190)

A large loosely defined group of acute or chronic involvements of subcutaneous tissue, fibrous tissue, muscles and joint capsule, of ligament, tendon and fibrous connective tissue of certain peripheral areas, due to a wide variety of causes, most of which are not conclusively defined. The condition may be manifested by pain, tenderness or stiffness of any involved portion of the body. Clinical and laboratory findings are minimal or absent.

A General Measures

- 1 Eliminate aggravating factors
- 2 Rest. Selection on physical management of joint disease page 324
- 3 Analgesic (see page 3)

B Local Measures

- 1 Local heat (see page 334)
- 2 Potassium Hydrochloride U.S.P. 0.5-2.0% injection into the affected areas. (Of doubtful value)
- 3 X-ray therapy (by physician) in selected cases which fail to respond to other therapy
- 4 Massage and graduated exercises may be valuable
- 5 Stripping of the involved structure preceded by local heat or cold electrolytic procedure if it alone may give complete relief in one instance. If only partial relief is obtained the procedure may be repeated daily.

GOUT (code No 610 741)

A disease of unknown etiology characterized by recurrent acute arthritis due to deposition of sodium urate in the articular and peritendinous areas as well as in soft tissue areas throughout the body. Recurrent attacks of acute arthritis episode by episode typically asymptomatic periods is almost pathognomonic of gout and the finding of tophi is diagnostic. An elevated blood uric acid level is very common even in asymptomatic periods. X-ray findings of punched out areas about the joints almost diagnostic but the occurrence

Treatment of the Acute AttacksA Specific Measures

- 1 Colchicine U S P B P is the drug of choice. It should be given as early as possible in the acute attack or during the prodromata to obtain maximum benefit. Give 0.5 mg ($\frac{1}{120}$ gr) every 1 hour or 1 mg ($\frac{1}{60}$ gr) every 2 hours until there is relief from pain or until nausea or diarrhea appear then stop the drug. The usual total dose to achieve this is 4-8 mg ($\frac{1}{16}$ to $\frac{1}{8}$ gr) and the pain and swelling will subside in 24-72 hours. Once the patient knows the dose that produces toxic symptoms, the drug should be given in a single dose of about 1 mg ($\frac{1}{60}$ gr) less than this. Then continue colchicine 0.5 mg ($\frac{1}{120}$ gr) b i d q i d until attack has completely subsided. If diarrhea becomes too severe treat as for any acute diarrhea (see page 258).
- 2 Corticotropin (ACTH) and the cortisones provide dramatic symptomatic relief in acute episodes of gout and if given for a sufficient length of time will control most acute attacks without relapse. Since colchicine seems to be about equally effective and provides a more lasting effect, it still appears to be the drug of choice. It has been observed that when corticotropin and cortisone are discontinued shortly after termination of attacks, many patients promptly relapse unless colchicine is given.

B General Measures1 Drugs

- a Analgesics. At times the pain of an acute attack may be so severe that relief of pain is necessary before colchicine becomes effective. In these cases a codeine with or without aspirin may be given. Morphine should be avoided for fear of addiction in this chronic disease.
- b Cinchophons. Neocinchophan should not be used.
- 2 Rest. Bed rest is very important in the management of the acute attack. Bed rest should be continued for about 24 hours after the acute attack has completely subsided. Early ambulation may precipitate a recurrence.
- 3 Physical therapy. Is of little value during the acute attack although hot or cold compresses to the affected joints may make some patients more comfortable.

Interim Treatment

A Specific Measures. Therapeutic intervention of acute attacks has been generally quite disappointing.

B General Measures

- 1 Diet. Most low purine diets (low weekly allowance of meat and avoidance of kidney, liver, sweetbread, sardines, anchovies, meat extracts) tend to become trivially inadequate and often fail to influence the hyperuricemia or course of the disease. However, a govt. authority states the restriction of high purine foods appears to be of some importance in prevention of progression of the disease. If specific foods or alcoholic beverages precipitate attacks these should be avoided. However, the little evidence that alcohol in moderation will precipitate attacks or is otherwise harmful in patients with gout.
- 2 Colchicine prophylaxis is a questionably effective. If it does

not influence the incidence of attacks cellulitis should be
re-evaluated in paroxysms

Treatment of Complications

A Chronic Gouty Arthritis In recent years the outlook for patients
with the disease has greatly improved. In many cases the

progress of the disease is arrested and in many cases the
absorption of gouty deposits may occur. Thus conditions can be
treated by a low purine diet and the newer uricosuric drugs.

1 Uricosuric drugs

a Probenecid NND (Benemid) — at which blocks
the tubular reabsorption of filtered uric acid has been
proven to relieve chronic gouty arthritis. Dose of 0.5
Gm (7½ gr) b.i.d. over long periods. It may
be given indefinitely if tophi are visible. The blood uric
acid level is greater than 7 mg% if it keeps a

quiet. The maintenance of alkalinization with sodium
bicarbonate or sodium citrate and fluid intake helps
high. Acute episodes of gout may occasionally be pre-
ceded by this treatment but this is usually with alkali
demonstrated after continuous treatment. Full dose of
colchicine may be given with Benemid.

b Saliylates — Large doses of salicylates up to 5 Gm
(75 gr) daily have been reported to produce uricosuric
effect similar to the above with relief of symptoms. Do
not combine with Benemid.

Phenylbutazone NND (Butazolidin) has been re-
ported to provide relief to acute inflammation
produced by low grade of uric acid but this is a
relatively dangerous technique especially when used for long
periods. It demonstrates daily toxicity. 100 mg
tablets 3 tablets daily as needed. Toxicity
includes a hypotensive effect especially
in elderly and debilitated.

2 Salicylism — may occur when high plasma levels of
formulated salt is not well excreted.

B Renal Complication The formation of uric acid may be
decreased if patients are encouraged to drink at least 3000 cc of
fluid daily. On the other hand a small amount of uric acid
deposits the stone although forcing fluids and alkalinizing the
urine with 3-6 Gm (4 dr) of sodium citrate daily may be helpful at times preventing further
stone formation.

PHYSICAL MANAGEMENT OF ARTHRITIC JOINTS (PHYSICAL THERAPY)

General Principles

Certain general principles which apply to the treatment of
disordered joints emphasize

1 Arrangement of the affected joints in comfortable position
which will provide for optimum physical use in the event that
joint motion becomes eventually lost.

2 In the ankylosing form of arthritis after the acute process

3.4 Physical Therapy

has subsided. Employ careful active exercises or passive mobilization early and regularly as tolerated in order to prevent deformity and to preserve joint motion.

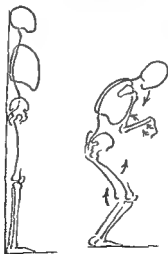
3. Avoid measures which cause a persistent increase in symptoms. So-called routine measures (e.g., heat) are not uniformly tolerated by patients. The order, balance of heat, massage, rest and exercise must be planned for a patient.

4. Patients with joint disease (particularly rheumatoid or suppurative arthritis) are in constant threat of deformity. Guard particularly against flexion deformities.

5. The services of a specialist in physical therapy should be utilized whenever possible.

6. If the arthritis is severe, the course of the disease seems unfavorable, or ankylosis appears inevitable, early consultation with a specialist is imperative. Special orthopedic measures such as manipulation under anesthesia, use of special casts, braces and corsets, and surgical measures including arthroplasty, arthroplasty, tenotomy, arthrodesis, and synectomy may be required.

7. Emphasize to the patient the importance of complete cooperation and his responsibility with the physical therapy program at home as well as in the office or hospital. Stress the importance of year-round continuation of treatment if necessary. Instruct the patient and/or his family and friends as to the extent and proper use of heat, immobilization and passive mobilization under home conditions.



Normal Posture and the Deforming Tendencies of Joint Disease

OPTIMAL FUNCTIONAL POSITION OF JOINTS

Should ankylosis seem inevitable despite adequate therapy or desirable early orthopedic consultation is imperative. The following table gives certain commonly accepted optimal functional positions in which joints may be permitted to fuse. It must be emphasized however that a given position is functional for a given individual depending upon such factors as living habits, occupation, recreation, and personal preferences.

Joint	Position
Shoulder	Arm abducted at about 75°. The elbow joint flexed in line with the anterior chest and with partial pronation of the forearm.
Elbow	Elbow at slightly less than 90° with the forearm in a position midway between supination and pronation. Exceptions: laborers, full supination; clerical work, full pronation.
Wrist	Slight (30°) dorsiflexion.
Hand	Partial flexion of fingers and metacarpophalangeal joints and partial opposition of thumb.
Hip	Unilateral in lying: Extension with minimal abduction and minimal lateral rotation. Bilateral in sitting: Slight flexion of one hip joint and the other as above.
Knee	Active and passive: Full extension; sedentary and passive: Slight flexion. Young individuals with active epiphyses: Only slight flexion.
Ankle	Foot at 90° angle with leg; minimally everted.

REST, IMMOBILIZATION AND SUPPORT

Spine. Rest in a comfortable position on a flat, firm bed without pillow at the head is essential. A 3 x 5 ft. plywood or other simple type of bedboard placed under the thin firm hair or felt mattress is advisable. Immobilization and support of the spine by a simple well-applied adhesive strapping may give prompt temporary relief. Suitable corset or back braces may be employed on ambulatory patients with mild symptoms. Special body molds (plaster shell) or rigid jackets may be advised by the orthopedist for patients confined to bed.

Cervical Spine. Rest in a comfortable position on a flat, firm bed without a pillow (see above). Immobilization and support of head may be accomplished by special orthopedic or home-made collars. The latter may be made simply by folding a soft bath towel twice lengthwise and wrapping snugly around neck and fastening with pins. Traction may be necessary if discomfort or pain is severe.

Shoulder. Rest in bed in a comfortable position on a flat, firm bed with use of a pillow (see above). Support the arm with pillows in a position of intermediate abduction and external rotation. After

patient is ambulatory the arm of the involved shoulder may be supported by a sling

Elbow Support the arm and hand (thumb and fingers free) in a molded bivalve plaster cast with the elbow in a position of maximum tolerated tension. This is to combat the natural flexion tendency.

Wrist Provide rest and support for the hand in a bivalve splint which corrects the natural deforming tendency toward flexion and ulnar deviation. At first the splint should be worn continuously except for removal 1 or 2 times daily to permit physical therapy. Later the splint need be worn only in bed.

Hand A supporting plaster splint fitted into the palm and extending to form a pocket for the partially flexed fingers may preserve the natural flexion tendency of hyperextension of the metacarpophalangeal and distal interphalangeal joints and flexion of the proximal interphalangeal joints. This splint should be removed 2 to 3 times daily to permit physical therapy.

Hip The patient should be able to sit. A detachable plaster hip spica may be used to provide support and rest for the acutely involved hip joint. It may be worn all night but it must be removed at least 2 or 3 times daily to permit physical therapy (at least in the case of rheumatoid joints). The patient is instructed to lie on the bed with 1 or 2 pillows (as necessary) under the abdomen; the pelvis for 1/2 to 1 hour 3 or 2 times daily. (The weight of the body is utilized as a leverage against the powerful flexor muscles of the thighs.) The pillows may be removed as tolerated and a thigh flexion deformity is corrected.

Knee The patient should initially be able to sit. Weight bearing upon the acute joint should be restricted or prohibited. In mild and nondeformed joints the potential plaster splint is sufficient to use and will suffice. It should be worn almost continuously while the patient is unable to walk. The plaster splint may be employed on patients who are able to walk. When joint involvement is more marked and flexion deformity is present correct plaster cast applied in position of maximum correction and left for 2 days. The cast is bivalved and removed for physical therapy twice a day. New casts are made to provide further correction as indicated. During convalescence or chronic phase provide support for the knee with elastic bandage posterior splint or special orthopedic brace.

Ankle and Foot Weight bearing upon the acutely involved joint must be prohibited. Provide a cradle or large pillow at the foot of the bed in order to hold the bedclothes off the foot. A supporting removable plaster boot cast (with tips of toes exposed) is valuable. Adjustable or bivalved plaster foot cast may be employed for the gradual correction of deformities. Provide well built shoes allowing proper length and width for toes stability and a suitable arch support (sponge rubber or felt pad a quilted insole). Correct abnormalities and deformities of the hip and knee joints which produce mechanical strain on the feet.

Chapter 13

TECHNIQUES OF MEDICAL REHABILITATION

By rehabilitation is meant the habilitation of the physically handicapped patient to his maximum physical and social capacity. To be most effective it should be started at the onset of illness, whether chronic or definite, through proper habilitation of the patient to enable him to achieve the maximum possible recovery to the patient.

Rehabilitation is often aided by the removal of the original illness by inactivity (e.g., bed rest) and activity in a fully positive state of wakefulness. For example, flexion on the trunk, distal ulcers and peripheral ulcers in the limbs and myocardial infarction are avoidable if rehabilitation is started early. Furthermore, the patient's psychological response to his illness is much more favorable if he knows that the physical gain in treatment goes beyond the immediate medical problem included in the treatment to use full function.

The techniques used in medical habilitation are primarily physical and educational. Physical measures consist of positioning, splinting, bracing, and exercise. Within the limits of the ability of the patient, the training should be directed to maximum function with the aid of orthopedic devices. Rehabilitation procedures are related to the help of a rising staff of therapists (physical, physical, speech, etc.) under the direction of the physician. In the home management of a disabled patient, members of the family may be instructed in rehabilitation procedures.

PREVENTION OF DISUSE PHENOMENA

Immobilization inactivity of a part of the body leads to changes which may be grouped under the term disuse phenomena (see also page 328). Lack of activity may be caused by paralysis, pain, limited joint motion (ankylosis), contracture, atrophy, amputations, arthrosis, and restricted activity of medical or psychological causes. Disuse phenomena lead to further disability and thereby aggravation and extension of disease.

The main reason for the prevention of disuse phenomena are as follows:

- (1) Prevention of joint motion (see page 334-2)
- (2) Proper positioning and support (see page 325)
- (3) Changing position (see page 329) including the tilt table (see page 330)
- (4) Exercise (see page 334) (See also B & E, see page 329 Stand up Exercise, see page 331 and Occupational Therapy, see page 334-2)

Cause and Prevention of Disuse Phenomena

	C a u s e s	P r e v e n t i o n
At a trophy (weak)	Lack of	Exercise
Joint ont (limit d range)	Lack of joint motion	Change f position pass: e range f motion splinting and support
Orth a sti hypot ro	Lack of t position	Tilt tabl and sta d up la s
Bon m phy (te po o i and uru ry lithf al)	Lack of w ght b ari g and m i p li	Tilt bi d ta d p e l a Gen l x el
De ub t u al	P i g d p ss	Ch g f pos ti
V n us th mbo	Sl w d us fl w	Change f p ti F i
Hyp t ti pn monia	Lack of ch t pan so	Change f positi E i
U nary inco tin e	U a liability f epta l at tim f voiding	U nial b d pa ded s te d of i dw ling e th te

CHANGE OF POSITION

Frequent change of position is the most important single measure in the management of the disabled patient. Patient susceptible to pressure sores require frequent shifting. The time in each position should be prescribed by the physician in the form of a precise schedule including all therapeutic and nursing procedures. Routine orders such as up in chair as tolerated are ineffective and may even be harmful. For example a paraplegic who tolerates six hours sitting in a chair will develop bilateral ischial pressure sores.

The following is a sample change of position schedule which was prescribed for a patient with a severe neurologic disease (early transverse spinal cord lesion). Let us assume that because of flaccid paralysis sensory loss heavy weight and lack of substantial fat padding the maximum time for pressure over the sacrum trochanters and ischia must be limited to one half hour.

Sample Change of Position Schedule

7 00 7 30 a m	Bed b th	3 00 3 30 p m	Tilt bl
7 30 8 00 a m	Chair (b alkaf t)	3 30 4 30 p m	Bed (half h rt)
8 00 9 00 a m	Bed (half h rt 1 t and half h 1 ft 1 t dec bit)	4 30 5 00 p m	Chair (dinn)
9 00 9 30 a m	Comm de (how l training)	5 00 7 00 p m	Bed (half h rt 1 t d ubitus half hr Fowl s po half h 1 ft lat d bi s h lf h pi)
9 30 10 30 a m	Bed (half h pine half hr F w l po)	7 00 10 00 p m	Bed (p on)
10 30 11 00 a m	Tilt tabl	10 00 11 30 p m	Bed (h lf hr rt 1 t d ubit s half h pi half h 1 ft 1 t d bi)
11 00 a m 12 00 noon	Bed (p)	11 30 p m 2 30 a m	Bed (pro)
12 00 noon 12 30 p m	Chair (lun h)	2 30 4 00 a m	Bed (half h rt 1 t d bit half h pi e half h 1 t i dec bit a)
12 30 3 00 p m	Bed (half h rt 1 t d bit half h s pin h lf h 1 ft lat d bit on hr po)	4 00 7 00 a m	Bed (pro)

In a patient in prolonged coma the need for change of position is similar but the chair and tilt table has to be eliminated in favor of the prone position. The prone position is well tolerated by the comatose patient and can be maintained for several hours without causing pressure sores and also will permit postural drainage of respiratory secretions. In an elderly patient in danger of orthostatic hypotension however the chair and tilt table may dominate the day schedule. A chair period should not exceed one hour in the ideal patient because of the danger of knee and hip flexion contractures.

While the comatose and severely paralyzed patient depends entirely on the nursing staff for his change of position the patient with some physical ability should carry out his change of position by himself or with minor assistance. (See Exercises below.)

BED AND BED EXERCISES

To permit change of position as well as getting in and out the bed must have the following features: (1) A firm mattress (preferably two inch foam rubber over a wooden board). (2) A ladder if the patient cannot get up without holding on. (3) An overhead frame with trap to facilitate sitting up and getting out of bed. (4) A footboard mainly to prevent the sheets from creeping on the feet. In the paraplegic the feet should rest against the footboard to prevent foot drop. (5) The height of the bed should be the tilt table height of the height according to the need of the patient. (6) The bed must be secure against the floor so that it does not slide or roll when the patient gets out or in or leans against it.

Bed Exercises

Bed exercises comprise the aggregate of activities which change of position self care and occupational therapy and special exercises.

A Active Change of Position. This may be carried out by the patient under the direction of the nurse or the physical therapist with some assistance. Example. To turn from supine to the right side move the body toward the left edge of the bed pull up the left knee each with the left arm for the right side rail and pull the body over to the right side.

B Self Care Feeding washing with grooming should be done by the patient as much as possible unless contraindicated.

C Specific Bed Exercises

1. Sit straight up sitting (Bed flat patient supine neck red head on mattress on side rails) Raise right leg to vertical position with knee extended Lower slowly onto bed. Do the same with the left leg. Repeat each leg ten times.
2. Sit up (Head of bed raised to 45 degrees) Patient pin on neck reclining hands folded behind neck legs straight) Raise trunk into sitting position. Relax slowly. Repeat ten times.
3. Chin-ups (Bed flat patient prone both hands on overhead trapeze) Raise trunk by bending elbow until shoulders are at the level of the trapeze. Lower trunk slowly. Repeat ten times.

CONTRAINDICATIONS. When complete bed rest is indicated (see page 1) all bed exercises are contraindicated. Certain of the exercises may be contraindicated because of local condition (pain

fracture etc.) The amount of activity should often be gradually increased, and the exercises prescribed must be chosen accordingly.

TILT TABLE

The tilt table is a useful device for the gradual establishment of weight bearing or erect position and for retraining in weight bearing or erect position in patients unable to stand. Weight bearing helps prevent or counteracts osteoporosis in the lower extremities. The erect position even as a change of pressure area prevents flexion contracture and develops extensor spasticity in upper motor neuron lesions. It facilitates chest expansion and urinary drainage and prevents loss of sense of verticality and development of orthostatic hypotension. Gradual establishment of erect position helps overcome existing orthostatic hypotension. The tilt table is contraindicated in unconsciousness, severe pain, and acute illness.

Technique

A tilt table resembles a stretcher whose top can be tilted gradually from a horizontal to a vertical position. A footboard at the lower end prevents the patient from sliding down and allows weight bearing. The patient may be strapped to the table top across the pelvis, knees, and chest as needed. He should not be immobilized more than necessary and should perform some exercise activity during the standing period. The angle of tilt is determined by the desired amount of weight bearing and erect position. It is usually between 45 and 80°.

In most patients for whom the tilt table is indicated, it is possible to begin with patients who have been in bed for a long period. The tilted position must be established gradually over a period of days and weeks. Once the patient is used to the tilt table, he may remain in the maximum tilt position up to one hour, two or three times daily. Tilt table treatment is begun as follows:

1. Bind the patient's lower extremities tightly with elastic bandages and apply a tight abdominal binder (asciatus).
2. Place the patient on a flat tilt table and fasten the straps across the pelvis, knees, and chest.
3. Apply a BP cuff to the arm and record the BP.
4. Tilt the table 15° and take BP every two or three minutes.
 - a. If the patient feels faint or dizzy, discontinue BP drops, return to flat position and start over, raising the table only 10° (if the patient complains of dizziness, the BP does not drop, encourage him to stay up and proceed as below).
 - b. If the patient is all right but the BP drops, watch closely. After a few minutes the BP may rise and stabilize slightly below the patient's normal pressure. Do not increase tilt but maintain a 15° tilt for 15-30 minutes. If the BP continues to drop, the patient will soon feel dizzy and should be returned to the flat position.
 - c. If the patient feels all right and the BP maintains itself for several minutes, increase tilt by another 15°.
5. Continue procedure until the patient tolerates the desired tilt. Then gradually eliminate bandages and abdominal binder.

STAND-UP EXERCISES

Stand p e e cises are indi t d w n th is a d for w ght bearing nd e e t position (see Tilt Tabl p g 330) at ngth ing of calf th gh and t nk m u c l to in a e spirat ry and circu l tory eff cy to de elop tanding bala and in prep ration for ambul tion unl as combin d w th stand up exercises) The e exe cises ar ontr indicated in ac te ill e diac d omp sation and e rly moyo a d l inf ctio

Techn

Th i e consists of standi g up from a chai ing the p wa of th kn hip and t unk exte o The r s can b do on o e leg If th pati nt is y weak a v ry high chair m ai be us d Ac d g to th h ght and str ngth of the p tient wooden Bl cks six fo two i che high with a six by six in h ba e and h ll wed c nt s are pla d unde the leg f th B Th p ti t f ces th foot end of th b d and m y teady him lf by holding o to th b d f me He m et w ar sho s which do n t slip on th floo A two by tw l bo d bra ed g inst the legs of the bed is u ef l in tabli i g the pati nt foot Th p t n of the w ight b i g l s s h that th heel lines up with th fr t l g s of th cha The umber and sp d f t nd p d pe d upon the indi vidual p t nt Two to ix ion a d y a e u ally pr s b d best at the b g n n g and/o at th nd of th h i p e i d An v g p escription is t n tand up pe e ion t the rat of two p r min t

REHABILITATION OF THE HEMIPLEGIC PATIENT

Advan i phys cal m d i h egi n whop to the p ti nt wh suff s f m h miple g a a diti n which is ounte ed mor a d m in clin cal m dici The followi g p gram is in t d d to ser nly guide it appl s to th typ cal cas f erbral l accide t b t th p i ciples ar th me in B miple g a of a y tiol gy

B d Ph

St ts on o d or th d d y f illness o as oon a the patie t is on s Th patient s bed sho l d b f h i h ght and h old B e aid rails and an ov rh ad t pe e

A B is Start w th t minut s of i e e ry two h and inc s to 30 m nut of x i e e y tw ho s

- 1 With good arm a d leg turn from b k to lde to abd me then to oth lde a d th n b k Repeat in ppo lte dir to
- 2 W th good h nd o t pe e pull t s ttng po ition and back
- 3 M e aid w y pw rds and d wnw ds in b d
- 4 Sit p on edge of bed with lde rail moved legs da gling and m e along dg of b d with aid of good a m a d i g

B S If C (all d with g od hand)

- 1 T liet activities Wash f a d h ds comb hai sh ve
- 2 Fe ding ti ita s At fi t i a b d with b ck o l d p l t r itting o edg of bed

C B i g N d g bed ph s

Standing Phase

Starts three to five days after beginning bed phase replaces bed phase as soon as possible. Patient is placed in a chair with his good side next to the foot of the bed the vertical bar of the overhead frame in reach of his good hand and the paralyzed arm in a sling.

A Exercise (See also page 331) Start with ten minutes of exercise every two hours and increase to 30 minutes every two hours.

- 1 Raise to standing position on good leg. Sit back.
- 2 Standing with good hand on vertical bar of overhead frame perform slight knee bend and straighten up. Repeat with gradually deeper knee bends.
- 3 Stand with good hand on vertical bar of bed frame. Go up on toes come back down.

B Self Care (using good hand)

- 1 Toilet activities. Complete bath in bed.
- 2 Dressing activities. Dress and undress except for shoes.

C Bracing

- 1 Fit wooden splint (attached to volar surface with ace bandage & straps) from one inch below the elbow to one half inch beyond the fingertips of the paralyzed arm.
- 2 Keep paralyzed arm in sling to prevent pull on shoulder.
- 3 If after two weeks the paralyzed leg still remains completely flail a long leg brace is needed in order to continue rehabilitation.

Stair climbing Phase

Starts two to ten days after the beginning of the standing phase and should replace standing phase as soon as possible.

A Exercise. Performed four times a day increasing from several steps to a whole flight of stairs. The patient is placed in a chair facing the foot of a flight of stairs the good arm next to the banister. The paralyzed arm is splinted and in a sling and the paralyzed leg is in a long leg brace if needed.

- 1 Pull to standing position holding to the banister with the good hand step up one at a time with the good leg then pull paralyzed leg up to the same step. Continue for several steps.
- 2 Step backward and down with the paralyzed leg and put the good leg down next to it. Continue for several steps.
- 3 While several stairs up turn toward and reach over to the opposite banister. Step forward and down with the paralyzed leg. Then place good leg next to paralyzed leg and continue.

B Self Care. Complete toilet and feeding and dressing activities should be possible by this time.

C Bracing

- 1 Long leg brace if indicated (see Standing Phase).
- 2 If patient has a foot drop during stair climbing he should have a short leg brace with a 90° posterior stop at ankle.
- 3 If the patient shows evidence of inversion or eversion of the foot he should have a short leg brace with a T strap.
- 4 If function has returned to the paralyzed leg and the splint may be discarded. Otherwise it should be worn intermittently.

Cane walking Phase

Starts as soon as the patient is capable of walking up and down a whole flight of stairs without tiring. Paralyzed arm is kept in a sling and cane is held with good hand. Two different styles are

cane are recommended for the hemiplegic patient

- A Slide G-1 (For fearful patients or patients with poor balance)
Move cane forward, place good foot next to cane and then the paralyzed foot next to good foot
- B Figure 11 Standing on good leg place cane under paralyzed leg forward simultaneously and put weight on them. Swing good leg through in front of cane and paralyzed leg and put weight on it. Continue in this fashion

Special Problems in Hemiplegic Patients

- A Care of the Paralyzed Upper Extremity
- 1 Complete absence of function. In most cases no useful function returns to the paralyzed upper extremity and the wrist and hands must be supported in the sling. The sling may be discarded later when the shoulder muscles become spastic and the patient feels limited by the sling. With his good hand the patient should move the paralyzed finger, wrist and elbow through the full range of motion twice a day in order to move the paralyzed shoulder through the full range of motion. The patient may need a cord through an overhead pulley by means of which the paralyzed arm (tied at the wrist) can be pulled up as high as possible with the good arm.
 - 2 Partial function. If only partial function returns to the paralyzed extremity the patient should use it only for the extent to which it is helpful or expedient. For other activities the sling should be trained in the use of the good extremity.
 - 3 Complete function. If complete function returns the patient should use the extremity as much as possible.
- B Time of Aphasia. If aphasia occurs before the apy (ideally in the first period) should be started as soon as possible. If sensory or receptive aphasia is present the above program may be rendered extremely difficult. It is based on the ability of the patient to understand what is required of him.
- C Care of Hemiparesis (minor problem). If hemiparesis is present the patient should be trained to turn his head to the hemiparesis side in order to bring his visual field in front of him. Later the adjustment in the visual field occurs.
- D Care of Spincter. Some hemiplegics are incontinent in the early phase. A indwelling catheter is rarely necessary. The patient should be reminded to empty his bladder voluntarily at hourly intervals. The interval can be gradually increased.
- E Organic Mental Syndrome. When this is present the whole rehabilitation program becomes difficult. The patient may be intelligent and understand or may be unable to once trained. The conclusion may be present at one time and absent at another and attention should be taken of the patient's moods. Organic mental syndrome occurs usually in patients who have had a cerebral stroke. The patient's mental state usually improves considerably during the rehabilitation program.

REHABILITATION THERAPY

Physiotherapy

Physiotherapy can be defined as a method of treatment and prevention of muscular skeletal disorders by the use of light

electricity cold heat exercise and passive mobilization. The latter three are used most commonly.

- A Heat Heat therapy is indicated in acute and convalescent diseases of the joint muscles fasciae tendons and bursa to relieve pain and to reduce muscle spasm and for chronic involvement of these areas to relieve pain reduce muscle spasm hasten recovery and to serve as an adjunct or preparation for other physical therapy methods. It is contraindicated in local diseases of the skin peripheral vascular disease (as circulatory insufficiency see page 207) and in patients with loss of sensation.

Technic Place the part to be treated in a comfortable and relaxed position. Begin slowly and cautiously. Treat for short periods not longer than 15 to 20 minutes initially. When the skin is pink and moist discontinue. Start with low temperatures adjusted to patient's tolerance. Gradually increase time and temperature as tolerated and indicated (average time is 30 minutes). Avoid drafts. Following treatments provide protective covering for 20 to 30 minutes to avoid chilling.

There is no evidence that any of the specific methods given below have more therapeutic value than others or are preferable in certain conditions although they differ in penetration.

- 1 Conductive heat (direct contact) Hot water bottle or electric heating pad. Moist heat can be administered to local area as hot compresses (hot packs) soaks or whirlpool or paraffin baths. Tub baths and the Hubbard tank permit submersion of the whole body and simultaneous administration of stretching and exercise (see below).
- 2 Radiant heat Electric bulbs or infra red lamps. A baker's salamander reflecting hood with several bulbs.
- 3 Conversive heat Heat may be developed by the resistance of tissues to the passage of high frequency wave or ultrasonic vibrations. Treatment of this sort may be more effective than other forms of heat treatment in certain patients with involvement of the spine and large joints. It is contraindicated in late pregnancy and in patient with malignancy. Long wave diathermy short wave diathermy militherm (adar wave lengths) and ultrasound equipment are used for this purpose and certain points deserve consideration.
 - a Special equipment is required and treatment must be administered by a trained operator. Never permit self treatment with diathermy by a patient at home.
 - b Rarely used in lieu of other simple methods are usually equally effective.
 - c No specific therapeutic effects other than heating action.

II Exercise

- 1 Therapeutic exercise is a voluntary active motion of part or all of the body designed to produce improvement of function.
 - a Assisted exercise Voluntary movement by the patient directed and assisted by the therapist.
 - b Independent exercise Voluntary movement under direction but without assistance.
 - c Resistive exercise Voluntary movement against graded loads or resistance as the final step in the repetitive exercise. Specific remedial exercises and occupational therapy represent a more advanced type of resistive exercise.

- 2 Specific planned remedial exercises. A great many specific functional exercises have been designed to correct abnormality of joint function and muscle weakness. The various home remedial instructions already mentioned may be called to mind. Many of the common and well accepted exercises include (1) weight and pulley exercises for elbow and shoulder girdle (2) hand exercises (squeezing rubber ball or sponge or hand pump) of fist making exercises (may be formed under water in basins) (3) drawing exercises (pulling on Hbb dials) for pin and gutter and low extremities (4) parallel support devices to promote weight bearing (5) upper and lower extremity joints (6) postural exercises. Postural exercises are carried out as follows:

bitting. Sit chair and maintain tall, upright position for 2-5 minutes.

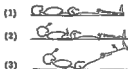
b Standing (see below)

- (1) Standing with weight on knees, slightly flexed
- (2) Rhythmic circular lumbar rotation of the spine and the pine glands
- (3) Gradually tighten knees

(1) (2) (3)



Standing



Lying Down

Lying down (see below)

- (1) Lying on back
- (2) Pelvic rotation and lumbar spine and knees to floor
- (3) Raise pelvis, legs and heels simultaneously

d Walking

- (1) Walk with weight evenly distributed on feet, posture straight ahead
- (2) Rhythmic hip and pelvic rotation by tilting the pelvis and maintaining the lumbar position
- (3) Rhythmic chest and pelvic rotation by tilting the thorax and rotating the abdomen
- (4) Stretching the back of the hip of the head toward the long axis of the spine and the pelvis and the pelvis
- (5) Staggered walk, possible

- C Passive Mobilization** The principal types of passive motion exercises are described below. Stretching and range of motion exercises may be prescribed as often as every 2 hours. Massage is usually given once a day; manipulation not often than once or twice a week. The minimum of therapy depends upon the patient's condition. Passive motion and stretching should be repeated several times for each joint. If only one joint is involved the procedure will last only 2 to 3 minutes. If several are treated it will last longer but should not exceed 15 minutes. If all joints cannot be treated in one session the number of treatments should be increased and the joints alternated.
1. **Passive motion of joint through the existing range** This is done by a physical therapist or other person or by the patient himself. The movement is slow. It should cover the complete available range and be repeated several times. No force should be used and the patient should be relaxed. The objective is to prevent loss of range of motion, particularly in patients immobilized by splints, slings, and bandages, etc.
 2. **Stretching** Similar to passive motion and somewhat forceful, it is carried slightly beyond the existing range. This procedure may cause a certain amount of pain and should be preceded by analgesics. Stretching should be performed only by a physical therapist. Indication In defining types of arthritis, stretching is used to decrease flexion contractures. In osteoarthritis and fibrositis it may actually lead to cure by giving complete pain relief. In postural correction stretching is an adjunct to active exercises.
 3. **Manipulation** A passive rather forceful and sudden mobilization of joint in a direction which is not used physiologically, e.g., sideward motion or rotation in a metacarpophalangeal joint. Manipulation should be done only by a physician, preferably with an anesthesia. It is used to break up painful intra-articular adhesions. It may also be used instead of stretching. It has the advantage that the mobilization cannot be counteracted by voluntary contraction or spasm because of the direction of the pull.
 4. **Massage** (minor physiological value) Essentially a mobilization of soft tissues by direct manual or digital action.

OCCUPATIONAL THERAPY

Occupational therapy is defined as a medically prescribed activity with the emphasis on purposeful activities. These include (1) self-care training (e.g., feeding, washing, dressing), (2) recreational activities (e.g., weaving, wood carving, needlework, painting), and (3) prevocational activities (e.g., typing, business machine operation, machine shop work).

SPEECH THERAPY

Speech therapy is the medically prescribed correction of speech disturbances resulting from (1) psychiatric causes (e.g., stuttering), (2) neurological causes (e.g., aphasia, vocal cord paralysis), or (3) otolaryngological causes (e.g., cleft palate, deafness).

Chapter 14

DISEASES OF THE NERVOUS SYSTEM

DISORDERS OF CONSCIOUSNESS

Disturbances of the consciousness may be associated with decreased activity (e.g. sleep) or increased motor activity (e.g. excitement delirium mania). Severe disturbance may range from partial including complete obliteration of consciousness. The pattern of reaction of the disorder depends upon the nature and intensity of the stimulus and the physiological and mental status of the individual. Some of the aetiological factors are trauma, cerebral abscesses, drug intoxication, poisoning, infectious diseases, meningitis, overwhelming infection, convulsions, disorders and cardiac decompensation.

STUPOR (code No. 933) and COMA (code No. 932)

Stupor ranges from partial to almost complete loss of consciousness. Coma is complete unconsciousness from which the patient cannot be aroused even by the most painful stimuli.

History

A history of the onset of the patient during the last 24 hours. Valuable information may also be obtained from the patient's relatives and attendants. Inquire particularly about the patient's previous physical and mental illnesses, diabetes, trauma, alcohol, drugs, epilepsy or hypertension.

Physical Examination Place particular emphasis on vital signs, deep reflexes, pupillary reaction and neurological examination. Document any severe disturbance as a total or partial loss of consciousness, loss of reflexes, etc.

Laboratory Procedures

1. Check the patient if necessary and examine urine. If necessary, for blood sugar and acetone.
2. Take Hgb, WBC, differential, urea and hematology.
3. If available, NPN, glucose, blood urea nitrogen and total protein of serum of emia, diabetic coma and hypotension.
4. Lumbar puncture should be considered if all other points are negative.
5. Special studies may be indicated: glucose, blood count and analysis of body fluids for various toxins.
6. Skull x-ray when indicated.

Treatment

A Emergency Measures *Maintain life until specific diagnosis is made and treatment administered*

- 1 Maintain adequate respiration First determine the cause of any respiratory difficulty (e.g. obstruction pulmonary disease depression of respiratory center vascular collapse)
 - a *Keep airways open* Place patient on his side or abdomen with face to the side and head well extended (NEVER on his back or with head flexed) If necessary pull tongue forward with fingers or forceps and maintain in an extended position (e.g. by pharyngeal airway) Aspirate mucus blood and saliva from the mouth and nose with a lubricated soft rubber catheter If no suction apparatus is available use a 25-50 cc syringe Endotracheal catheterization or tracheotomy may be necessary (CAUTION Do not allow endotracheal tube to remain for more than 2 hours because of danger of laryngeal edema and further obstruction upon its removal) The services of a trained anesthesiologist or otolaryngologist are desirable for this
 - b Artificial respiration may be administered if respiration has ceased or is failing (see page 150)
 - c Oxygen may be administered by mask catheter or tent as indicated (see page 138)
- 2 **SHOCK** Institute immediate treatment if patient is in shock or may suffer shock (see page 27)

B General Measures

- 1 Constant observation of the patient must be maintained
- 2 Unless contraindicated place in shock position (see page 2) and change body positions every 1/2 hour to prevent hypostatic pneumonia and skin ulcerations
- 3 Catheterize patient if anuria persists for longer than 8 to 12 hours and patient fails to void If necessary insert an indwelling catheter Use sterile technique
- 4 Nutrition and hydration Provide proper fluid and nutrition by I.V. glucose amino acids and saline solutions (see page 20) for the first few days until the patient is able to take fluids by mouth If the patient is comatose for more than 2-3 days tube feedings must be employed (see page 59)
- 5 Sedation
 - a Whenever possible avoid administration of other medication until a specific diagnosis has been made
 - b Sedation with paraldehyde or barbiturates may be necessary for mild restlessness in those cases not due to barbiturate or other drug toxicity
- 6 **Specific Measures** Treat specific cause such as fever infections toxin (see specific diseases)

DELIRIUM (code No 931) and MANIA (code No 937)

Delirium is characterized by mental disturbances (e.g. illusions delusions and hallucinations) physical excitement with restlessness and lack of coherence

Mania is often temporary characterized by wild emotionality and at times by illusions delusions and hallucinatory trends

These two conditions are discussed together because they have many points in common. The principal therapeutic differences are in the choice of sedative and hypnotic medications. Although most sedative and hypnotic drug in proper dosage may be used with relative impunity in many the number of drugs which can be employed in delirium is limited. Chloral hydrate is contraindicated in actual alcohol delirium. (For diagnosis see Com # 335.)

Treatment

A Place From Physiological

1. **Quarter** — the best room available preferably on lowest floor of building
2. **Windows** — Screen or otherwise protect windows. Locked heavy screens are most desirable.
3. **Furniture** — Remove all furniture and furnishing from the room except a low bed and bed with side board or at times simply a mattress on the floor. The room must be free of sharp objects.
4. **Avoid mechanical irritants** whenever possible except for specific medical or surgical reasons. Use chemical restraint — use hydrotherapy as much as indicated. Observe for suicidal or destructive tendencies.

B Psychological

1. Be kindly and understanding. Reassure patient's actions as those of a confused and sick person.
2. **Lighting and noise** — See that the room is adequately lighted both day and night and free from shadow. Unusual noise should be avoided but familiar sounds may actually serve to reassure the patient. Remember that the patient may be confused and will misinterpret strange sensory stimuli.
3. Help the patient to understand what is happening and why he is in his particular situation. Do not misinterpret. Explain diagnosis and therapeutic procedure when necessary.
4. **Relatives and friends** — Recruit aid from relatives and friends — include a familiar figure as they may serve to lessen the patient's apprehension. However, psychiatric patients frequently become disturbed under these circumstances.
5. **Constant nursing attention** — is necessary.

C Sedative and Hypnotic Drug Therapy

1. **Chlorpromazine Hydrochloride U.S.P. (Thorazine®)**
 - a. In acutely agitated or disturbed patient chlorpromazine may be used effectively to relieve agitation. The initial dose is 25-50 mg ($\frac{3}{8}$ - $\frac{3}{4}$ gr) by deep intramuscular injection. Subsequent injection may be required at intervals of 4 to 6 hours. In less acutely disturbed patients give oral promazine 25 mg ($\frac{3}{8}$ gr) tid in response if necessary to 100-400 mg (1 1/2 - 6 gr) daily.
 - b. **Toxicity** — Jaundice is observed occasionally (about 1-5%) but is reversible with withdrawal of the drug. Amphetamine if it may be required to overcome drowsiness.
2. **Reserpine N.N.D. (Reserpan® Serp 12)** — Effective in every delirious bed patient.
 - a. Give 2.5-5 mg ($\frac{1}{4}$ - $\frac{1}{2}$ gr) 1 M and tartaric acid solution 1 mg ($\frac{1}{80}$ gr) bid. Injection may have to be repeated daily or every other day for 12 weeks. Main maintenance of 12 mg daily thereafter.

b Toxic reactions include moderate to severe depression (usually reversible on withdrawal of the drug) nasal congestion agranulocytosis and lethargy

3 **Tranquilizing drugs recently introduced include**

- a Meprobamate N N D (Miltown® Equanil®) For oral use only average dose 0.4 to 0.8 Gm (6 to 12 gr) q i d
- Promazine Hydrochloride N N D (Sparine®) Suitable for intramuscular or intravenous use initial dose 50 to 150 mg (3/4 to 2 1/4 gr) depending on degree of excitement. Thereafter intramuscular or oral doses of 100 mg (1/4 to 1 1/4 gr) q i d
- Prochlorperazine N N D (Compazine®) For oral use in doses of 5 to 10 mg (1/12 to 1/6 gr) t i d
- d Perphenazine (Trilafon®) For oral use starting with 2 to 4 mg (1/30 to 1/15 gr) t i d Average daily dose 100 mg (1/4 gr) With higher doses extrapyramidal symptoms may occur

4 Paraldehyde U S P is useful in delirium. Barbiturates, bromides and opiates often increase the excitement of delirium but may be used in maniacal states (see below). The ordinary stock paraldehyde solution needs no sterilization and for that reason is available for immediate administration by any desired route. The oral route is preferred unless the patient is unable to swallow. For details of administration see page 40.

5 Chloral Hydrate U S P may be given instead of paraldehyde in doses of 2 to 6 cc (1/2 to 2 dr) of the 25% stock solution or as as follows: 0.5 to 2 Gm (7 1/2 to 30 gr) orally. It is contraindicated in acute alcoholic delirium or psychosis.

6 Barbiturates *not to be used for delirium.* Observe for respiratory depression and maintain adequate airway.

a Thiopental Sodium U S P (Thiopental Sodium B P (Pentothal Sodium®) First inject 3 cc of a freshly prepared 5% solution slowly i v observe then give additional dosage as needed for desired effect.

b Amobarbital Sodium U S P (Amytal Sodium®) 0.125 to 0.5 Gm (2 to 7 1/2 gr) as freshly prepared 10% solution slowly i v to point of desired effect.

7 Morphine Sulfate U S P 8 to 15 mg (1/8 to 1/4 gr) with Scopolamine Hydrobromide U S P 0.3 to 0.4 mg (1/2 to 1/160 gr) may be administered but when delirium is marked or associated with trauma caused by pain.

8 Scopolamine Hydrobromide U S P For delirium without pain scopolamine 0.3 to 0.4 mg (1/2 to 1/160 gr) b i d q i d may be valuable.

D Hydrotherapy

1 A warm tub bath (92 to 97 F) or a so-called neutral bath for half hour periods t i d or q i d may be tried on suitable patients. This may be of considerable value. This method should be tried prior to instituting drug therapy when reasonable. If it is tolerated well and results are effective the patient may remain in the tub for hours. Hydrotherapy is not applicable for certain unmanageable patients for patients with infectious or fibrile disease or for patients with surgical drainage.

2. Wet pack. This effective technique should be administered only by trained personnel. The patient requires constant supervision. The method is contraindicated in patients who are physiologically exhausted, restrained convulsions, or who have a significant decrease in vital signs at intervals of at least 15-20 minutes.
- F. Nutrition and Hydration. Unless there is specific indication for hypohydration, a normal state of hydration should be maintained. This is especially true in the presence of food intake. Intake of alcohol is limited to 12 oz (1.2 qt) of 5-10% glucose solution containing 100 mg (14 g) of Thiamine Hydrochloride U.S.P. Anesthesia Hydrochloride B.P. 100 mg Nicotine A.D. U.S.P. should be given daily. Proper utilization should be maintained. Small frequent feedings are beneficial.
- F. Prophylaxis. If ordinary measures as mentioned above do not suffice, consider transfer to psychiatric hospital. Evaluation of effectiveness of treatment and if decided upon, provide for adequate treatment.

HEAD INJURIES

Proper management of the patient with a head injury rests in getting him under proper logical and a logical diagnostic and treatment methods.

Diagnosis

Clinical examination and clinical observation of the patient with immediate patient treatment are essential.

A. Signs and Symptoms

1. Altered mental state of consciousness; the immediate period after the head injury.
2. Altered interval followed by coma may indicate cerebral compression by subdural or epidural hemorrhage. If progressively deepening, more severe rapid onset of unconsciousness following a head injury, a pleurocentesis or trepanation is indicated to rule out subdural or epidural hemorrhage.
3. Progressive focal signs may indicate a dural hemorrhage.
 - a. Pupil usually dilated.
 - b. Contralateral hemiparesis may occur rarely.
4. If the patient remains unconscious, diagnosis is a progressive intracranial hemorrhage is often difficult.
 - a. Vital signs (pulse, temperature, blood pressure) may change, although these are not reliable signs.
 - b. In case of deepening or unusually prolonged coma, a pleurocentesis or trepanation is indicated.
 - c. Prolonged unconsciousness is held to indicate damage to the brain tissue.

B. Laboratory Findings

1. Lumbar puncture is advisable to establish the presence of subarachnoid hemorrhage and to give the meninges and pressure of the cerebrospinal fluid.
2. Skull x-ray should be taken as soon as possible to indicate condition permits.

- a Presence site and nature of fractures may be described
- b Presence of pineal shift can be ascertained
- 3 Electroencephalography may assist diagnosis and prognosis in selected cases in the chronic phase. Cerebral angiography may help demonstrate subdural or intracerebral hematoma

Treatment

A Emergency Measures

- 1 Treat shock if present parenterally administered fluids and/or blood may be required (see page 29)
- 2 Attention to the respiratory tract is important maintenance of adequate airway and pulmonary ventilation is vital
 - a Patient should be placed in prone position with head turned to one side to facilitate drainage of secretions from mouth and to keep the tongue from obstructing the pharynx
 - b Intratracheal intubation or tracheostomy may be necessary to maintain open airway
 - c Give oxygen if necessary (see page 144)

B General Measures

- 1 Quieting patient. During acute or initial phases restlessness may be a disturbing factor
 - a Special nursing care and paraldehyde may be required
 - b Avoid morphine because of medullary depressant effects
 - c Catheterization of a full bladder may alleviate restlessness
 - d Lumbar puncture with removal of small amount of bloody cerebrospinal fluid may also relieve agitated patient
- 2 Antibiotic treatment is always indicated in the presence of bleeding or discharge from nose or ears. Give Procaine Penicillin (U.S.P. 600,000 units) bid or broad spectrum antibiotic until discharge of infection is past

VASODEPRESSOR SYNCOPE

(Vasovagal Syncope Simple Fainting Benign Faint)

This is usually characterized by a sudden fall in blood pressure and a slowing of the heart. The causative stimuli may be sensory (e.g. sudden pain) or entirely emotional (e.g. death of a loved one). The patient is usually upright when the faint occurs and recovery rapidly restores consciousness.

Treatment

Patient should be placed in the recumbent position and head lowered. Simple inhalation of fumes of Aromatic Spirits of Ammonia U.S.P. B.P. may be tried if necessary.

ORTHOSTATIC HYPOTENSION

(Postural Hypotension) (code No. 460 x10)

This is a rare cause of syncope and occurs as the patient assumes an upright position. It is associated with a marked drop in blood pressure on arising.

Treatment

Treatment is directed towards the underlying cause when possible. If abdominal ptosis is present, an abdominal belt may prevent splanchnic pooling of blood. Elastic stockings may be of value. Vasoconstrictor drugs may be tried but are usually without benefit.

CAROTID SINUS SYNCOPE (code No 409 584 x)

There is usually a history of fainting associated with spells of dizziness between attacks. A definite relation to sudden turning of the head or wearing of a tight collar may be noted. The diagnosis is suggested by reproducing attacks by firm pressure and massage over the carotid sinus for 10 to 20 seconds. Stimulate only one carotid sinus at a time. Caution must be exercised in stimulating the sinuses in elderly patients. Cerebrovascular accidents have been precipitated by this maneuver. Three types of carotid sinus syncope are known to occur.

Vagal Type

This is the most common type and is most frequent in older persons. Carotid sinus pressure slows the heart rate. This response can be abolished by the injection of Atropine Sulfate U.S.P. B.P. 1 mg (1/60 gr.) I.V.

Vasomotor Type

Occurs more frequently in younger individuals. Carotid sinus pressure causes a fall in blood pressure; this can be abolished by injection of 0.3 cc (5 M) of 1:1000 Epinephrine U.S.P. Adrenaline B.P. but is unaffected by atropine sulfate.

Cerebral Type

Carotid sinus pressure affects the heart rate and blood pressure and neither epinephrine nor atropine sulfate affects the fall. A direct cerebral effect is postulated.

Treatment

Correct all abnormalities when possible. Eliminate emotional problems and forbid use of tight collars. In severe cases denervation of the sinuses may be necessary. Local anesthesia of the carotid sinus abolishes all types of carotid sinus syncope.

A. Vagal Type Atropine Sulfate U.S.P. B.P. 0.4 to 0.8 mg

(1/160 to 1/100 gr.) 3 or 4 times daily (or more frequently) will usually abolish attacks. Ephedrine Sulfate U.S.P. or Hydrochloride N.F. 25 mg (3/8 gr.) with Phenobarbital U.S.P. 15 mg (1/4 gr.) 3 or 4 times daily or Amphetamine Sulfate U.S.P. 5 to 10 mg (1/12 to 1/6 gr.) may be used.

B. Vasomotor Type Ephedrine and phenobarbital is also useful

usually prevents attack.

C. Cerebral Type Drug therapy is of no value.**SYNCOPE DUE TO CARDIOVASCULAR DISORDERS**

This type of syncope is due to cerebral anoxia, which results from a temporary fall in arterial output. Some of the causes are

Stokes Adams syndrome onset of paroxysmal tachycardia myocardial infarction and pulmonary embolism. This may be associated with certain other types of heart disease (e.g. aortic stenosis and tetralogy of Fallot)

Treatment

Treat the underlying abnormality

SYNCOPE DUE TO METABOLIC DISTURBANCES

Hypoglycemia may cause syncope or coma. If prolonged or recurrent treatment is required (see page 410)

Hyperventilation if severe and prolonged produces respiratory alkalosis with resulting tetany and syncope

Treatment

Consciousness can be restored by rebreathing into a paper bag holding breath or administration of carbon dioxide 10% with oxygen by mask. If attacks are recurrent psychotherapy should be considered

VERTIGO

The term vertigo is generally used to denote the subjective sensation of rotatory movement either of the individual or his environment. Dizziness implies an inability to orient the body in relation to surrounding objects. However the terms are generally employed as synonyms. Vertigo is fundamentally in disassociation with labyrinth and their nuclei or connections. True vertigo is usually manifested by nystagmus falling to one side and abnormal reaction to tests of vestibular function. Among the more common causes are

1. Meniere's syndrome (see page 357)
2. Acute labyrinthitis (see page 357)
3. Organic brain damage involving the vestibular or cerebellar organs or connections or the cerebellum
4. Drug and toxins (e.g. strychnine see page 307)

Treatment

Treat the underlying disorder

HEADACHE (code No 961)

Headache may be due to many factors and must always be recognized as a symptom. The underlying cause must be determined and treated in order to effectively relieve the symptom. The subjective sensation of headache indicates involvement of the pain sensitive structures within and about the skull. Headaches may be classified as follows with some of the more common causes listed

1. Meningeal (and Allied) (see further below) This is due to a local or systemic meningitis or a cranial

p ssure a d d a d intracranial p ssure (following lumbar pun tu)

V ul l vol em nt

1 l t ranial va dil tat on Due to feve c t in drug and toxins (e g al hol and hi tami) psis or motion l fa tor

2 Ext acranial va odilat t on (particularly f th at real carotid) M gr line is th p incipal example

3 Di eas of the blood v s els (e g t mporal arteriti)

C M s uloskeletal In ol m t

1 M s le ap m of v rying degre s D e to myo ti ad t thritis or o teiti

2 Muscle ten on du to emot onal f tor

3 B ne o joint in olvement of k li h ad or cervical v rt b Due t arth itis o teitis o te my lit s or t mor

D Ne v l l m t N uralgias (e g t ig mls in uralgia)

E M ll s Ext ac l in l me t Due t dise and disorde of th yes ears nose pharynx t th tc

F Emoti on l l v lv m t H adache du t emotional d eord are u ally a t d with m scle te l n (e b ve) M t th s is t lways the case At times th h adache may be du l intracranial va d l t tio

D gno is

Th d gno is must be ba d on a ompl te history and phy l l xaminat on Sp c al att ntion t the ey s and n is im portant A mpl t blood count urin lysis and blood test f yphilis must be pe f med In m ny case an ad qu te p y h at e amun t o s also ind cated Skull y and l t o ncephalo g ms are u eful

Th pain f m ningeal involvem t i d ep a d is u ally th m at e P in f s ul igin is u ally throbbing in ch a ter pain of neuralgia has a burning qu lity He da h s of psy ho g i gna p f ial and r man f st d by d li tightness o P es u s

Ge l Non pe lli T m t M s

A Phy al and m t l st

B Sed ti m should be used only as a t mp rym ur and sh uld not be v d as a sub st tute f a complete w ll p and sp lli th py Na c t are g lly ont and cated ex cept in terminal d s ase

C An lg i s on t but ap if th py m f b l h d has due t thei antipyretic ctivity They should not be admini t d for p long dp od ind mnt ly th ir m ture u e ften ob cu s imp rtant p th l gy

HEADACHES DUE TO MENINGEAL INVOLVEMENT

Th e the m t e e e but th y usu lly e p d to an l g i Mani f stal ona d p ill upon type and afte f und lying p th logy

T m t

A Sp lli M Tr t th ti e lesion

III General Measures

- 1 Analgesics should be given as needed if pain is not too severe (see page 32)
- 2 Narcotics may be necessary if pain is very severe (see page 33)
- 3 Lumbar puncture performed very cautiously may sometimes be used to relieve headache associated with increased intracranial pressure (e.g. subarachnoid hemorrhage, hypertension, nephritis, not in posterior fossa tumors)

C Lumbar Puncture Headache These are believed to be due to leakage of the cerebrospinal fluid from the puncture site

- 1 Analgesics If headache is mild upon using analgesics such as Acetylsalicylic Acid U.S.P. (aspirin) 0.3 Gm (5 gr) q 3 hours may suffice. Codeine may be necessary
- 2 Recumbent position If lumbar puncture headache is very severe it can be alleviated by lying down
- 3 Intrathecal injection of small quantities of sterile normal saline may afford relief in severe cases

HEADACHES DUE TO VASCULAR INVOLVEMENT

These headaches are usually throbbing in character. Intracranial vasodilatation usually causes bilateral pain but migraine is usually unilateral. Compression of the common carotid may relieve both types of headache. Migraine may also be relieved by compression of the external carotid artery.

Treatment

A Intracranial Vasodilatation These are usually easily relieved by simple analgesics such as Acetylsalicylic Acid U.S.P. (aspirin) 0.3 to 0.6 Gm (5 to 10 gr) every 2 to 3 hours.

B Migraine (code No 930 x40) Extracranial vasodilatation (be careful to avoid involvement of external carotid or its branches)

1 Treatment of an attack

a Ergotamine Tartrate U.S.P. B.P.

(1) Ergotamine tartrate 1 M strength and route of choice is 25 to 50 mg ($\frac{1}{4}$ to $\frac{1}{2}$ oz) will relieve headache within an hour in most cases. Administer drug as early in attack as possible. Do not repeat dose more often than once weekly.

(2) Ergotamine tartrate by mouth 4 to 5 mg ($\frac{1}{15}$ to $\frac{1}{12}$ gr) sublingually or orally continue with 2 mg ($\frac{1}{30}$ gr) every hour until headache has disappeared or until a total of 11 mg ($\frac{1}{6}$ gr) has been administered. This method of administration is not generally advised because of the possibility of overdosage. If the patient vomits as a result of his disease it is impossible to know how much of the drug has been absorbed. Ergotamine is also less effective by the subcutaneous route.

(3) Toxic effects A few patients complain of numbness and tingling of extremities and some muscle pains and tension. Do not administer ergotamine to patients in septic or infectious states or who have peripheral vascular disease, arteriosclerosis, heart disease or who are pregnant.

- b Dihydroergot mine (D H E 45[®]) (not ac pt d) in do s of 1 0 mg (1/60 gr) I M or I V m y be substit ted for ergot mine tartrate Injection may be repeated n one h ur if necessary
 - c Ergotam ne withaffein (Cafergot[®]) or atropin i some tim s mo effe ti by the oral r ute al ne and r q ires a small total dos It is valiable as suppo to ies f m ctal use H emeats pre ents ral admini tration
 - d Pr ssure on extern l carotid or one of it It an h s e rly in th attack will often abol h p in 100% oxygen by na al mask may r lieve the ac te attack
- 2 G neral measure
- a U l l drug begun to reliev h ad che have patient m st in a hair
 - b After h d h e h s be n elieved patient should rest in bed for t l sat two hours in a q et d rken d room w th out food m d ink This will promot relaxati m and is ne cess y to prevent anothe attack from o curring immediately
- 3 Ab rting an atta It Many pat nt may abort their ti cks by the f llowing m ans
- a Attempt to gain maximum l sation by a wa m bath
 - b Re t in bed in dark ned room fo several h rs
 - c D ug
 - (1)P roborbital S durn U S P Pentoba bito S d ro B P 0 1 Gm (1 1/2 g) by m th
 - (2)E rgotam n Tar te U S F B P 3 4 mg (1/20 1/13 g) bu g lly
 - (3)A etyl H y l A m U S P B P (sp r l) 0 8 Gm (10 g) with o w th ut cod ne 0 08 Gm (1 m) by m outh m y be sef l in mild att ks
 - d It event o of f rth r ti ks Mg s s a pay hosomall disc R du tion: att ks may be ac omplished by pay hoit apy Th re is little evide ce that ap l l di t gl d lar th rapy nti allerge c m as re etc a If cti n ept a pay hoit h rapy ti devie s
- C H istam e H ad ch (Histo a C phal gis) S be ta so s in t n of 1 mg (1/60 g) hist m e ba (in histaman diph a ph t solutio) m y s metime rep odue th n dache withi 3 5 m n t s Des sri tion to histaman th s fo has been d osted sta ting w th small d s of h etam diphosphate (0 25 c) b i d and inc ea ing ch dose by 0 05 cc until s l cc d e in e h d Ther aft s a mant anc do e of l l 3 times w kly s inj cted
- D Di of Blood V s ls Sin e many of the e ondit o re a soci ted with o p t ph norm as v sodilate e re i di ted Ni otin c Acid U S P 100 mg (1 1/2 g) t d t q l d or lly ha b e fo d to b of limit d w l e

HEADACHES DUE TO MUSCULOSKELETAL INVOLVEMENT

Mu l contr ction or sp sm m y b c us d by d s a f the m a l adjac t t u tu es or m y b as oc t d with c ss f tigue o motion lt nation Th m a l att ch d to the oc ip t mo t freq nly inv l d d give th h a s t risti ipit l

headache. There may also be a feeling of pressure or tightness or a band like constriction of the head associated with emotional tension. The psychogenic headache usually appears after periods of emotional stress.

Treatment

- A Muscle spasm due to organic disease and bone or joint pain may be relieved by appropriate physical therapeutic measures (see page 323). Analgesics are usually also of value (see page 3). Specific therapy should be directed at the underlying disease.

B Muscular Tension Headaches

1. Rest, relaxation and freedom from emotional stress are of primary importance (see Psychotherapy on page 36).
2. Heat to the involved muscles by means of hot towels, heat ing pad or a warm bath will help relieve the discomfort.
3. Gentle massage of the muscles will usually also be of benefit.
4. Drugs may be of value in acute cases but prolonged use should be avoided.
 - a. Phenobarbital U.S.P. Phenobarbitone B.P. 15 30 mg (½ ¼ gr) q. d. will temporarily relieve many headaches due to muscular tension.
 - b. Acetylsalicylic Acid U.S.P. (aspirin) 0.3 to 0.6 Gm (½ 10 gr) every 3 to 4 hours may also be of benefit.
 - c. Tranquilizers (see pages 337 and 338).

THE DEGENERATIVE DISEASES

MULTIPLE SCLEROSIS (code No 906 953)

A disease of unknown etiology characterized by patchy demyelination in the central nervous system which may be due to a disease related with diffuse vascular thrombosis. It is manifested by diffuse neurological disturbances, cerebellar neuritis, nystagmus, slurred speech, intention tremor and spastic paralysis. C.S.F. examination shows nothing characteristic. The disease is slowly progressive with spontaneous temporary remissions.

Treatment

Chiefly symptomatic. Vasodilators (inhalation of 3-10% carbon dioxide, histamine infusions, amyl nitrite inhalations) are advocated for treatment of acute relapses by some experts.

- A. Rest. Adequate sleep at night and rest in the afternoon has been found to make patients more comfortable.
- B. Temperature Changes. Avoid sudden changes in temperature (extremes or internal) to reduce vasculature. This phenomenon (although evidence that pain plays a role in the disease is questioned by some). Heat makes the spasticism which worsens cold often improves them temporarily.
- C. Rehabilitation. Physical therapy and psychotherapy to attempt to make the patient try to live with his disability and try to make the most of whatever assets he still retains.

PARALYSIS AGITANS (Parkinsonism) (code No 946 4 953)

A syndrom char act riz d by rhythmi al pill rolling tremor f sti g muscles with aso iated pa t city and igidity a tooped postu ma k i k fac s and a propulsive gait In later lif it is us ally as ociat d with art rioscleroti changes in the b sal ganglia In younge life it is usually n with po te ceph lit c chang s in the basal ganglia

T m t

Tr tment s m inly symptomatic Little c n be done to arrest the pr gres ive posten - phalit m or arte iosclerotic changes that o r

A Sp ific M a u e A numbe of drugs ha b n found to b eff ti in all viating the symptoms of parki sonism Th se drugs are usually used in ombinat on to obtain the optim l the ap tic result

C ti In patie m with pa alysis agitans n ver stop one drug ab ptly when instit ting therapy with a new on Always int o- du e th n w drug in sl wly in r sing qu tti s whil grad u lly red ing the ld

1 Trih xyphe dyl Hyd o hlorid N N D (A tan [®]) Eff c ti for stain d c trol of igidity mino tremor and skines Dos g 1 o 2 mg ($\frac{1}{60}$ $\frac{1}{30}$ g) to 5 mg ($\frac{1}{12}$ g) t i d Po oculogyric isis u 10 mg ($\frac{1}{8}$ gr) t i d Pri ipal ide act n same s for atropine but c d o a ula ffe ts ml lm l Use with ution i gla oma in high do age Artan [®] m y cau e onf s o rest l ss e or hallu n tio s

2 Bell d n n ikaloids

At pine Solution of U S P H P (1/2%) Eff ct e for sp sma d gidity pa ticularly in post necephalit s St t with 3 d p do s ti terval f about 6 h ur in n as dos g by l d pe y 3 days until a dos ge f 10 drops t d s e hed Limited to y ng r p t ents be au of d ger of gl u om lde ly Ea ly t xic sympt ms blurring of vi ion dryn ss f m th ve tigo and t hy s dss E m ive dosag m y p d m ting d in a me tal c nf si nd hallu i ations

■ Belladonna Tin t re U S P H P H s am ff t as atropin Start with 15 drop t d and in case gradually t 30 d p t i d Chief m ffe ts a same a f at opin Do ot gl t pte ts w th glaucoma

3 D ph hyd mi Hyd hio id U S P (B n d yl[®]) F t l off t mor Dosag 50 mg ($\frac{3}{8}$ gr) b i d to q i d

4 B n t pi M than Ho t N N D (Cog nt n[®]) M t ff t e ge t g st ig dity and p m lso against t m E l l t wh c mbi d with t i h xyphe dyl (A tan [®]) w ll as ty ami (P gitan [®]) o m tr mph t mi (De d [®]) Chief sid tle dryne s f m th D ag B gin with 0.5 mg ($\frac{1}{120}$ g) 1 2 t mes daily and i cr d d p to 3 mg ($\frac{1}{12}$ g) daily

5 D t Amph t min S lfate U S P (De d i [®]) 5 mg ($\frac{1}{12}$ g) morning noo o Amph tamin S lf t U S P (B d i [®]) 10 mg ($\frac{1}{6}$ g) to ou ter ct f tigue om n l e and l th gy

ANTISPASMODIC DRUGS

Drug	Effects			
	Tremor	Rigidity Spasms	Anxiety	Oculogyria
Atropine and belladonna alkaloids		x		
Belladonna (Cogan's)	x	x		
Scopolamine (Papanicolaou's)		x		
Diphenhydramine (Diphenhydramine)			x	
Diphenhydramine (Diphenhydramine)	x			
Ethopropazine (P. M. L. Ly. an. 5)	x	x		
Hydroxyzine (Hydroxyzine)		x	x	x
Thioridazine (Thioridazine)	x			
Meprobamate (Meprobamate)		x	x	x
Meprobamate (Meprobamate)		x	x	x

Th M k R p o t A p i 1954 R p d d w t h p m

- 6 Hyoscine Hydrobromide U S P B P Useful in control of tremor Dosage ranges from 3 mg (1/200 gr) b i d to q d in elderly patients to 0.6 mg (1/100 gr) b i d t i d in the young Distressing side effects may include somnolence dry mouth blurred vision and drowsiness
- 7 Cycloamin Hydrochloride N N D (P. M. L. 5) Act on similar to that of trihexyphenidyl (Art. 5) but has less dryness effect Useful when effect from trihexyphenidyl wears off Dosage 125-5 mg (1/50-1/12 gr) t i d to q i d
- 8 Carbamphen hydrochloride (P. M. L. 5) Useful in young patients as muscle relaxant Adult dosage 50-100 mg (3/4-1 1/2 gr) q d
- 9 Ethopropazine Hydrochloride N N D (P. M. L. 5) Lyko van 5 25-30 mg (3/8-3/4 gr) q d
- 10 Meprobamate (hyoscine hydrobromide atropine sulfate and acetylmeprobamate hydrobromide) Has relatively little effect on tremor Tablets contain 0.3 mg (1/120 gr) of mixed belladonna alkaloids Give in 1/4 1/2 or full therapeutic dose b i d to q i d depending on age and tolerance of patient Side reactions dryness of mouth and blurred vision
- 11 Procyclidine Hydrochloride N N D (K. M. L. 5) Effective against rigidity Does not produce the pronounced dryness and blurred vision of some of the other drugs Dosage 2-5 mg (1/24-1/12 gr) t i d
- 12 Stramonium Tincture N F B P E. P. 11y good for control of tremor tenacious and persistent Still with 15 drops t i d and increases slowly to about 80 drops t i d
- 13 Tranquilizers If patient is tense and anxious give Chlorpromazine Hydrochloride U S P (Thorazine) 25-50 mg (3/8-3/4 gr) at bedtime Reserpine N N D (R. M. L. 5) Serpasil 0.25 mg (1/240 gr) t i d or q i d or Meprobamate, N N D (Miltow 5, Equ. 11) 400 mg (5 gr) q i d

†Contraindicated in glaucoma

General Measures

- 1 Physical therapy Should include passive stretching of muscles and active exercise when possible. Patient should be taught to exercise daily the muscles most severely affected especially those of hands fingers wrists elbows knees and neck.
- 2 Reassurance of control of symptoms and psychological support will be greatly helped by patient.
- 3 Avoid harmful habits. Permit moderate use of alcohol sometimes for relaxation.

Prognosis

The disease is slowly progressive but it is not fatal.

CEREBRAL VASCULAR ACCIDENTS

Cerebral vascular accidents are due either to thrombosis or hemorrhage or embolism. The differential diagnosis is important in order to treat the underlying cause (see table below).

Differential Diagnosis of Cerebral Vascular Accidents

	Hemorrhage (94x 9x5)	Thrombosis (94x 818)	Embolism (94x 818)
Age	45-65 yrs	Over 45 yrs	Any age
Underlying cause	Hypertension	Arteriosclerosis	Cardiac diseases
Onset	Sudden	Sudden or subacute	Sudden
History	Acute	Slight or absent	Variable
Mental status	Depressed	Normal to depressed	Normal to depressed
Paralysis	Complete hemiplegia	Slight partial hemiplegia	Slight partial hemiplegia
Spinal fluid pressure	High	Normal or slightly elevated	Variable
Blood in spinal fluid	Usually present	Usually absent	Abnormal or light

TreatmentA. Acute Phase or Onset

- 1 Complete bed rest
- 2 Nursing care. Handle patient as fully to avoid injury to patient and paralyzed extremities.
- 3 Sedation (Paraldehyde USP) If patient is agitated sedation may be given. However, get all with thrombosis should not be depressed too much with sedatives.
 - a Oral paraldehyde 4 (1 dr) in milk, fruit juice or whiskey repeated as necessary.
 - b Rectal paraldehyde 8-15 (2-4 dr) in 30 cc of oil.
 - c Intramuscular paraldehyde 4-8 (1-2 dr) deep into the buttock.
- 4 Feeding. If patient is unconscious unable to swallow do not attempt to give food by mouth. Maintain nutrition with tube feeding by parenteral means.

- 5 Phlebotomy If hemorrhage has occurred and blood pressure is elevated phlebotomy of 500 cc may be used to reduce chances of further bleeding
- 6 Lumbar puncture If hemorrhage has occurred perform lumbar puncture very cautiously removing just enough fluid to relieve severe headache Do not perform Queckenstedt's test in patients with suspected hemorrhage
- 7 Voiding Catheterization may be necessary if spontaneous voiding does not occur
- 8 Procaine block of the stellate ganglion has been recommended for thrombosis and cerebral embolism but is contraindicated in cases of hemorrhage
- 9 Maintenance on anticoagulant therapy (page 215) which has been advocated for treatment and prevention of recurrences of cerebral thrombosis or embolism may be of value in thrombosis or insufficiency of the carotid or vertebral basilar system and cerebral embolism
- B State of Recovery and Convalescence The rehabilitation of the patient with hemiplegia due to cerebral vascular accident should begin early and should be intense The details of the rehabilitation program are discussed on pages 327-334 2

Prognosis

If the patient survives the acute attack the prognosis for life may be good With active rehabilitation most patients will be able to walk and care for themselves Return of useful function to the upper extremity is rare (These patients can be trained to achieve a remarkable degree of recovery if given adequate care and rehabilitation) Prognosis for functional recovery is poor in those patients with severe residual organic mental syndrome or severe aphasia

HEPATO-LENTICULAR DEGENERATION (Wilson's Disease)

This extrapyramidal disease is characterized by progressive intention tremor astasia rigidity dysphagia contracture of muscle weakness and mental changes Flushing jaundice and associated liver disease have been reported to be due to a defect of copper metabolism

Treatment

Dimercaprol U.S.P. (BAL) has been reported to be effective in removing the excess copper The clinical effect is 2.5 mg (1/24 gr)/Kg body weight by injection b.i.d. for 10 to 12 days per course every 3 to 6 months

THE CONVULSIVE DISORDERS

EPILEPSY (Idiopathic) (code No. 934)

Epilepsy is a symptom complex which may be characterized by one or more of the following manifestations (Lennox)

- 1 Impairment of consciousness
- 2 Involuntary movement of one or more
- 3 Disturbance of the autonomic nervous system

Diagnosis

There are three major clinical types. The differential diagnosis is very important because the therapy of each differs. Individuals may have more than one type of seizure. Electroencephalographic study is indicated in all epileptic patients.

- A Grand Mal** (code No. 930 x01) (Rule out the cause of convulsions in this type) This type occurs in all age groups. The usual form has generalized tonic and clonic convulsions which may begin focally and remain so or may spread without loss of consciousness (Jacksonian). They may occur in single attacks varying in occurrence from hours to years.
- B Petit Mal** (code No. 930 x07) The usual form is characterized by a transient lapse of consciousness of 5 to 30 seconds and generally no convulsive seizures. During the attack there is commonly a rhythmical blinking of the eyes. It occurs most frequently in children and is rare after age 30.
- C Psychomotor Seizures** (Epileptic equivalents) (code No. 930 x08) These forms frequently occur in adults and may be characterized by periods of abnormal behavior. The patient's emotional content is usually not altered from normal during the attack. The attacks vary in character and the patients are often dangerous to themselves and society.
- D Status Epilepticus** (code No. 930 x06) A prolonged recurring series of grand mal type which exhausts patient and may be fatal.

Treatment

Excitability in epileptics not at all enhanced during an attack except in the case of patients from burning injury (e.g. biting his tongue).

- A Grand Mal** Never withdrawn on anticonvulsant drug suddenly.

1. **Diphenylhydantoin Sodium** (U.S.P. Phenytoin Sodium B.P. (Dilantin®)) is the drug of choice. Give 0.1 Gm (1½ gr) after evening meal 3 to 7 days in reaching dose by 0.1 Gm (1½ gr) daily. If seizures are brought under control. If attacks are severe and frequent may begin with 0.3 Gm (4½ gr) daily on first visit. Average dose 0.4 to 0.8 Gm (6 to 12 gr) per day. After convulsions subside, continued the Dilantin® may be reduced if desired but old symptoms again appear the dosage should immediately be raised again.
2. The side effects related to Dilantin® but most troublesome is gum hypertrophy. This should be controlled with a careful mouth hygiene and gum massage. When large doses are given toxicodermatitis may appear (see p. 354).
3. **Phenobarbital** (U.S.P. Phobarbital B.P. If patient on maximum dosage of Dilantin® and there is inadequate response give phenobarbital in addition in some minor and dosage as Dilantin® in reaching dosage as with Dilantin® while maintaining patient at full dosage of Dilantin®.
4. **Methyphenylhydantoin** (Mephentoin®) If excessive gum hypertrophy results from the use of Dilantin® methyphenylhydantoin may be tried in its place. The dosage is the same. Mephentoin® may be effective where grand mal and

petit mal cocktail. Do not suddenly change to Mesantoin® but gradually substitute for Dilantin®. Combination of both may prove more useful than the individual drugs. When using Mesantoin® special precautions should be observed for toxicity (see page 354).

4. Bromides: primidone (Mysoline®), mephobarbital (Mebaral®), benzachlorpropamide (Hibicon®) or ethosuximide (Peganone®) may be tried (see page 355).

B Petit Mal

1. Very mild state. If attacks are infrequent (less than 1 p day) give no treatment or treat only with small doses of phenobarbital.
2. Mild state.
 - a. Amphetamine Sulfate H S P (Benzedrine®) 5-10 mg ($\frac{1}{12}$ - $\frac{1}{6}$ gr) 2-3 times daily may be tried. Do not use if patient also suffers with grand mal because this drug may precipitate g and mal attacks.
 - b. Glutamic acid 8-10 Gm (2 $\frac{1}{2}$ - 3 gr) daily may decrease the number of attacks.

3. Moderate and severe states

- a. Trimethadione U S P (Tridione®) is the drug of choice. Trimethadione is very effective in petit mal epilepsy but unfortunately is not an entirely safe drug since it causes bone marrow depression in some individuals. Whenever this drug is used perform CBC once or twice a week for the first month then every two weeks for two or three months and monthly thereafter. Dosage: Begin with 0.3 Gm (5 gr) daily and increase the daily dose by 0.3 Gm (5 gr) every 7 days until attacks are controlled. Do not give more than 3 Gm (30 gr) daily.
- b. If g and mal seizures occur also trimethadione may aggravate this tendency therefore it may be necessary to administer medication for g and mal seizures simultaneously and in some cases atop the trimethadione.
- c. Paramethadione (Paramedione®) is said to be less toxic than trimethadione. It is almost equally effective in petit mal attack and may be effective where other drugs fail. Observe precautions as for trimethadione (see page 354).
- d. Phensuximide (Milonin®), phenobarbital (Mebaral®), ethosuximide (Peganone®), mephobarbital (Mebaral®) may prove useful (see page 355).

C Psychomotor Epilepsy Patients with psychomotor epilepsy

1. Diphenylhydantoin Sodium U S P (Phenytoin Sodium B P (Dilantin®)) with or without phenobarbital as first drug in epilepsy is the treatment of choice.
2. Phenacemide N N D (phenylacetyl) or Phenytoin® is effective in control of psychomotor epilepsy. Give initially 0.5 Gm (7 $\frac{1}{2}$ gr) daily and increase until symptoms are controlled up to 5 Gm (75 gr) daily divided into 3-5 equal doses. The drug is quite toxic and precautions must be observed with its use (see page 354).
3. Methylphenylhydantoin (Mesantoin®), mephobarbital (Mebaral®), primidone (Mysoline®), acetazolamide (Diamox®)

a d methauxim d (C lout n^o) alone or in combin tion with
oth dugs a f que tly seful

D Stat Epilepti

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tal Sod m U S P Ph n b r b t Sodium B 0 4
B 8 Gm (6 12 g) inj i d l wly m y be us d
- 2 Paral d hyd U S P 1 2 cc d l t e d in t ple volume of
aline I V lowly If onvulsion on t n e e p c t i V dos
t t VERY SLOWLY AND CAUTIOUSLY or g v e 8 12 i M
- 3 D phe ylhydantoi S d m U S P Ph ytoin Sod m B P
(D l a t i n Sod m^o) may b inject d i V at ate not e d
g 50 mg (3/4 gr) per m ute A total do ge of 150 250
mg (2 1/2 4 g) may b requ r d
- 4 E n e r l a n e s t h i a may be e d f all other measure fail
- 5 D i a l i n^o As soo e d t v meas ff ctiv p as
t o m a c h t b e t h r o g h n o e e n i f p t i e t a t i l l s c i o u
a d g B 1 0 2 Gm (1 1/2 3 g) D i t i n^o i w a t e r y
3 h o u r s t i l s e l z c o t l l e d (m a x m u m 10 d o s)

E D t o n o f T r e t m t M o t p i l p t i m t i e t h a p y
f l i f H o w e e i f i s r t r i y o t l l e d f o 3 5
y e t h e a n t i o v u l s a n t d u g m a y b l o w l y (v e r 1 2 y e a r s)
w t h d a w n t o a s c e r t n f e i z u r s t i l l o c u

F C r i M e s e s A c q u t i e p t i t w i t h h d s I n
s t b l e c a s t h m a y b a c o m p l e d n p t b y r a d g
b o o k s b o u t e p i l e p s y (b e l o w) E p i l p t i p a t i t s h o u l d
a o d h a d o u s o p t i o n s d i v i n g a d i t i v i t y I t i m
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Identification Card

THIS PATIENT HAS EPILEPSY

Name _____
Add s _____ Phon _____
M t a p a d d t k o p a d d d p o o i n h s m o u t h t o
M t t h t i g u K p h m f r o m i n j m g h i m s I f
D t s N m e _____
Add s _____ Phon _____

[illegible]

NARCOLEPSY

Narcolepsy is a clinical syndrome characterized by recurrent episodes of uncontrollable desire to sleep. It is frequently associated with a transient loss of muscle tone (cataplexy) especially during emotional reactions.

Treatment

- A Amphetamine Sulfate U.S.P. (Benzedin®) 10-175 mg ($\frac{1}{4}$ to $\frac{3}{4}$ gr) daily may be required. Optimum dosage may be determined by starting with dosage of 10 mg ($\frac{1}{6}$ gr) and increasing by 10 mg increments through the day. 10 to 20 mg ($\frac{1}{6}$ to $\frac{1}{3}$ gr) t.i.d. is an average dose.
- B Ephedrine Sulfate U.S.P. Ephedrine is not as satisfactory as amphetamine but is helpful in many cases. Optimum site and distribution of dose varies with patients. Average range of dose is 25-30 mg ($\frac{3}{8}$ to $\frac{3}{4}$ gr) b.i.d. q.i.d.

DISEASES OF THE CRANIAL NERVES

TRIGEMINAL NEURALGIA (code No. 984 x30)

Trigeminal neuralgia is characterized by sudden attacks of excruciating pain of short duration anywhere along the distribution of the 5th cranial nerve. The attacks are normally precipitated by stimulation (usually mild) of the trigger zone with each of the pain

Treatment

- A Medication treatment is generally not satisfactory but the following usually are tried before resorting to surgery.
- 1 Trichloroethylamine U.S.P. (Trilene®) 15-20 drops per day by inhalation from the dark blue tincture bottle or dissolved in one-half hour before meals.
 - 2 Methylsulfonylmethane B₁ (1000 mg) 2 capsules daily by mouth for 10 days. Has been reported to be effective in about 50% of the trigeminal neuralgia.
 - 3 Sodium methanesulfonate N.N.D. has been shown to produce a chemically specific effect on the facial and trigeminal nerves. 0.15 Gm ($\frac{1}{2}$ gr) 4 times daily dissolved in 10 cc 5% glucose and diluted with 15 cc of water per oral dose. Half-hourly administration of 10 daily injections recommended. Relief may be delayed for 3 months until the chemically specific effect is established. Side effects of nausea and vomiting with stimulation of parasympathetic system.
 - 4 Anticonvulsants e.g. Diphenylhydantoin Sodium U.S.P. (Dilantin®) 0.1 Gm ($\frac{1}{2}$ gr) q.i.d. or sodium valproate 50 mg ($\frac{3}{4}$ gr) q.i.d. have been reported to be helpful in some cases.
- B Surgery may be required if the above relief from medical treatment

BELL'S PALSY (Peripheral Facial Paralysis) (code No 965 y10)

A palsy is of all the muscles of one side of the face usually precipitated by exposure to chill or to sun.

Treatment

After the patient has recovered usually occurs gradually in 2-6 weeks it may take up to 12 years in older patients.

A Protection of Face

1. Keep face warm and avoid further exposure
2. Protect eye with a patch if necessary
3. Avoid wind and dust

B Physiotherapy

1. Support face by use of tape or wire if necessary of mouth looped about the ear
2. Electrical stimulation may be used to help prevent atrophy of muscles. Use every 2 days after the 14th day
3. Get the masseter in an upward direction for 10 minutes 2-3 times daily of the involved muscles may help the tone
4. Heat from infra-red lamp may help to relieve

MENIERE'S SYNDROME (code No x00)

Meniere's syndrome is a symptom complex of unknown etiology which involves the labyrinthine portion of the 8th cranial nerve manifested by a sudden recurrent attack of vertigo, nausea, vomiting, nystagmus and tinnitus and by progressive deafness.

Treatment**A Special Diet** Non available**B General Measures**

1. Rest is essential. Many of these patients have marked psychoneurosis
2. Salt restriction and Anemomium Chloride USP BP 12 Gm (15-30 g) qd may be helpful
3. Nitroglycerin USP (in oil solution) 50-100 mg (3/4-1 1/2 g) 1-2 times daily 100 mg (1 1/2 gr) orally 3-6 times daily has been found useful
4. The antihistamines especially Diphenhydramine Hydrochloride USP (Benadryl®) and Dimenhydrinate USP (Dramamine®) in doses of 50-100 mg (3/4-1 1/2 gr) 3-4 times daily appear to be of benefit to the patient
5. Most of the vertiginous portion of the affected 8th cranial nerve may be preserved if the cause is not responsible to medical treatment

DISORDERS OF EQUILIBRIUM**ACUTE LABYRINTHITIS (code No x85 910)**

Acute labyrinthitis is an acute inflammation of the inner ear which usually follows purulent infection and is manifested by intense vertigo usually with marked tinnitus and staggering gait and nystagmus.

TreatmentA Specific Measures None availableB General Measures

- 1 Bed rest preferably in darkened room until symptoms subside
- 2 Drugs
 - a Antibiotics are of little value unless there is a local infection of middle ear or mastoid
 - b Antihistamine drugs may be of some value (as for motion sickness see below)
 - c Sedation is generally helpful Phenobarbital U.S.P. Phobarbitone B.P. 15.60 mg (1/4 gr) t.i.d. 10 q.i.d.
 - d Chlorpromazine Hydrochloride U.S.P. (Thorazine) 50 mg (3/4 gr) i.m. (or other phenothiazine derivative see page 42) is useful in the acute early phase

MOTION SICKNESS (code No 010 576)

Motion sickness is an acute illness characterized by anorexia, nausea, dizziness and vomiting. Many factors play a part in its production; the principal ones being visual kinesthetic and psychological. Physiologically the vestibular apparatus appears to be involved.

Prophylaxis

Preventive measures are often effective. Attacks of motion sickness are difficult to treat successfully.

- A The antihistamines appear to be of benefit. Menthylamine U.S.P. (Dr. Mamine[®]) or Diphenhydramine Hydrochloride U.S.P. (Benadryl[®]) 50-100 mg (3/4-1 1/2 gr) q.i.d. is said to be very effective.
- B Meclozine Hydrochloride B.D. (Bonine[®]) 25 mg 100 mg effective against the usual dose is 50 mg (3/4 gr) y.e. 12 hours.
- C Cyclizine Hydrochloride B.D. (Mar[®]) is effective orally or i.m. doses of 50 mg (3/4 gr) x p.i. 4-6 hours p.r.n.
- D Parasympathetic depressant also effective in combination with mild sedatives. Scopolamine Hydrobromide U.S.P. or Atropine Sulfate U.S.P. 0.2-0.4 mg (1/300-1/150 gr) q.i.d. 3-6 hours.
- E Milder sedation. Phenobarbital U.S.P. Phobarbitone B.P. 15-30 mg (1/4-1/2 gr) q.i.d. 3-6 hours may help prevent attacks.

PERIPHERAL NEURITIS (code No 011 710)

Peripheral neuritis can be caused by a large number of factors, both local and general. This may be either a sensory involvement (with pain, paresthesias and other subjective sensory disturbances) or motor involvement (weakness and paralysis) but more frequently both.

- A Toxic Factors E.g. lead, mercury, alcohol, etc.

B if g Co ll m B e type of multiple neuritis
 C D fl e cy Typ Esp lly of the B compl (be b l) i oft
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Tr im t

I tr im in h d p en d s p n th etiologic l f to r s

A Sp c f T im t

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 pl x Thiam e Hyd o hlo de U S P A i e Hyd
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 e te ally d D d Y st U S P (b w a y l)
 10 30 Gm (1/3 t) daily f e t i e B compl (see page
 62)

3 A t t hgh l r i c d t i l n d t d

4 I l d polyn r i t s of ch i t g a g t such a Ed th
 m i C l m d dium N M D (EDTA V e ate[®]) m y
 b be f l (p g 54)

5 I e t cal p lyneur t s Dum cap l U S P B P
 (BAL[®]) (see pag 535)

B G l T im t

1 H d t P l e p a i t b d H p o thl a d a v o d u of
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 ov fo t f bed to p e e t p e sur of bed c e
 A lgesics e see y to o t l p (see p g 3)

3 Phys l th apy (page 333) Aft p has sub d d
 phy l th r py (m as g a d p i m t l o) m y be of
 v l e E ou s g t e m o t i n a t h s m t i m e P e t
 i i e s by m a n s of phat d p e t t h i g

HERNIATION OF INTERVERTEBRAL DISK (code No 2511 8x9)

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 low r b ck p av sep l i m b a m a c l p s m and pain disting
 l g th iat d i t b t i n o m m o n l y c o u n t e d O a t f
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 b k t i b a c k i n j u r o f f l l Th i n i t i p i d m y b
 f l l w d b y a n t v a l f y m p t m a t i m p r o v m e n t

Exagg at on of symptom B c m p l a n t f l l o w f q u a t i y p o n
 l a g h u n g t a u n g s a z i n g

T d s i n s t a t i c t h a l g e o u of th s t i n r
 m p i r d t a g h t l g r a i s u n g d m n b e d n k l e j B i m p a d s n
 t o o d e t r i b t o n of L3 of S1 may be d e m n s t r t d

C h a t i s t i o e t g l g l d f t i n t h b k n d p a c
 e l l y p o d d b y B t d i n t e r v t h l d i s k a n d m d i l y
 d m o n t b l b y m y l o g r p h y

TreatmentA Specific Measures None availableB General Measures

- 1 Bed rest preferably in darkened room until symptoms subside
- 2 Drugs
 - a Antibiotics are of little value and as there is associated infection of middle ear or mastoid
 - b Antihistamine drugs may be of some value (as for motion sickness see below)
 - c Sedation is generally helpful Phenobarbital U S P Phenobarbitone B P 15-60 mg (1/4-1 gr) t.i.d. to q.i.d.
 - d Chlorpromazine Hydrochloride U S P (Thorazine®) 50 mg (3/4 gr) i.b. (or other phenothiazine derivative see page 42) is useful in the acute early phase

MOTION SICKNESS (code No 010 576)

Motion sickness is an acute illness characterized by an intense nausea, dizziness and vomiting. Many factors play a role in the production of the principal ones being visual kinesthetic and psychological. Physiologically the vestibular apparatus appears to be involved.

Prophylaxis

Preventive measures are often difficult. All kinds of motion sickness are difficult to treat successfully.

- A The anti histamines appear to be of benefit Dimhydrinate U S P (Dramamine®) or Diphenhydramine Hydrochloride U S P (Benadryl®) 50-100 mg (3/4-1 1/2 gr) q.i.d. said to be very effective
- B Meclizine Hydrochloride N N D (Bonamine®) a long acting effective agent. The usual dose is 50 mg (3/4 gr) every 12 hours
- C Cyclizine Hydrochloride N N D (Malaris®) a flucivine oral dose of 50 mg (3/4 gr) repeat in 6-8 hours p.r.n.
- D Parasympathetic depressants also seem in combination with meclizine (see Scopolamine Hydrobromide U S P or Atropine Sulfate U S P 0.2-0.4 mg (1/300-1/150 gr) every 3-6 hours
- E Mild Sedation Phenobarbital U S P Phenobarbitone B P 15-30 mg (1/4-1/2 gr) every 3-6 hours may help prevent attacks

PERIPHERAL NEURITIS (code No 98 710)

Peripheral neuritis can be caused by a large number of factors both local and general. There may be either sensory or motor (with pain paresthesias and other subjective sensory disturbances) or motor involvement (weakness and paralysis) but more frequently both.

A Toxic Factors. E.g. lead arsenic mercury or diptheria toxins

therapeutic test of Neostigmine Methylsulfate USP (Prostigmin®) 1.5 mg (1/45 gr) with Atropine Sulfate USP 0.6 mg (1/100 gr) (diagnostic ampul) subcutaneously be used. This causes relief of symptoms.

Treatment

A Emergency Treatment Patient may develop inability to swallow or respiratory distress. Patient should always carry 2 ampuls of 0.5 mg (1/20 gr) of Neostigmine Methylsulfate USP BP. This should be given immediately subcutaneous or intramuscular if severe symptoms develop. The patient should be placed under medical care at once and if additional neostigmine is needed 1 mg (1/50 gr) may be given parenterally 2 or 3 times in an hour until adequate response is obtained.

In spite of administration of increasingly large amounts of neostigmine, weakness of the skeletal muscles of respiration may occur which may be fatal in some cases.

- 1 When such an event can be anticipated tracheotomy and oxygen equipment suction apparatus and respirator should be available.
- 2 Following tracheotomy patient is placed in position to receive oxygen administered and Neostigmine is withheld. Atropine Sulfate USP 0.6 mg (1/100 gr) is given to keep airway dry and suction of airway employed.
- 3 Maintaining fluid and electrolyte balance during artificial respiration. Penicillin G antibiotic therapy is recommended.
- 4 After a few days it is usually possible to gradually discontinue patient in the respirator as tolerated.
- 5 Patient who survives may occur in a permanent slight disability.

B Specific Management

- 1 Neostigmine Bromide USP BP 15 mg (1/4 gr) as tablets. Dose as follows from 4 to 12 tablets daily. Begin with 1 tablet every 4 hours (4 times a day) and increase as required to give relief.
- 2 Ephedrine Sulfate USP 12 mg (1/3 gr) with the help of neostigmine facilitates the intubation of the trachea.
- 3 Patient who has labored breathing should be given atropine and neostigmine. It may be necessary to give in close intervals of 4 to 6 Gm (60 to 90 gr) Potassium Chloride USP 4 times a day. This is indicated if digoxin or digitalis is present.
- 4 Edrophonium Chloride NND (Tensilon®) may relieve myasthenia weakness. 10 mg I.V. gives relief in 30 seconds. 50 mg I.M. gives a prompt relief for 4 hours. Two to 3 mg (1/30 to 1/20 gr) I.V. may be used as a test dose for patient to determine time to distinguish between the effects (impulse) and overstimulation (cholinergic).
- 5 Pyridostigmine Bromide (Mestinon®) a analog of neostigmine is at times more effective in the treatment of the mild weakness. It is applied in 60 mg (1 gr) tablets. Dose 10 to 25 tablets daily in divided doses to produce maximal relief.
- 6 Ambroxonium Chloride (Mylas®) is said to be twice as long as neostigmine and has fewer side effects. Start with 5 mg (1/12 gr) tid and increase as needed. Average dose 5 to 25 mg (1/12 to 3/8 gr) qid.

360 Myasthenia Gravis

Treatment

A General Measures

- 1 In acute phase bed rest heat applied locally to back and girdles and use of a bed board under mattress are indicated
- 2 Traction to the lower extremities is frequently beneficial
- 3 The avoidance of severe physical effort and strain is essential to minimize recurrence of symptoms after the initial episode
- 4 Use of low back belts braces or supports may be beneficial. It is important to instruct patient as to proper method of bending lifting (with knees flexed) and carrying (with object held close to body)

B Surgical Measures Where response to conservative measures is poor or when recurrences have disabled the patient surgery is indicated. Gratifying relief of the major complaint of most patients is pain usually follows the successful removal of the offending herniated disk. Recovery of other neural functions (impaired motor power muscle atrophy and sensory changes) may be expected later.

MYOPATHIES

MYOTONIA

(Congenital code No 270 044) (Acquired code No 270 x20)

Myotonia is a disorder characterized by difficulty in relaxation of skeletal muscles following contraction which is initiated either by voluntary effort or by mechanical or electrical stimulation. It is important to differentiate this disease from myasthenia (see below) because treatment with neostigmine or potassium aggravates myotonia.

Treatment

Quinidine Sulfate U.S.P. B.P. 0.30 Gm (59 gr) 3-4 times daily may be satisfactory symptoms.

PROGRESSIVE MUSCULAR DYSTROPHY (code No 270 9x8)

A disorder characterized by progressive wasting and weakness of muscles with associated peripheral hypertrophy (fat infiltration) of certain muscle groups. It is important to differentiate this from myasthenia gravis because the latter can be benefited by treatment.

Treatment

None of value. It has been suggested that inability to metabolize vitamin E may play a role in the disease but parallel experimental administration of this substance has been of no benefit.

MYASTHENIA GRAVIS (code No 270 562)

Myasthenia gravis is a disorder characterized by weakness and marked fatigability of voluntary muscles. It varies from weakness or fatigue occurs with exertion or persists in mild attacks. The disease progresses by natural spontaneous remission and relapses. A

Chapter 15

METABOLIC AND ENDOCRINE DISEASES

DISEASES OF THE PITUITARY

In the diagnosis and treatment of endocrine disorders it must be remembered that there is a very close interrelationship of the various endocrine glands. Not only do hormones exert a profound effect on all tissues of the body but the endocrine glands also exert strong influence upon each other. For this reason the manifestation of endocrine disease may be either primary to a given endocrine gland or secondary to a defect in the function of a target gland. For example the patient with hypopituitarism may present with a pituitary failure, hypothyroidism and diabetes mellitus. It is appreciated that the diagnosis of these disorders is often difficult and that at times the diagnosis of one disorder may be obscured by the presence of another.

PANHYPOPITUITARISM (code No 841 777) HYPOPITUITARY CACHEXIA (Simmonds Disease) (code No 841 7773)

Occurs in hypopituitarism as a direct result of the failure of the pituitary which may be caused by tumours of the gland or postpartum haemorrhage (Sheehan's syndrome).

The term panhypopituitarism is properly a misnomer since the significance varies in the symptomatology of the disease as may be due to varying degrees of the several hypopituitarisms. Hypopituitary cachexia is also a misleading term in that the patient may be of normal weight and may actually be obese. Symptoms of the various hypopituitarisms usually include weight loss, weakness, sensitivity to cold, loss of appetite and in females amenorrhoea. Physical examination reveals the features of the various hypopituitarisms. Laboratory findings are as follows: low B.M.R., low diiodine uptake, PBI is decreased, sensitivity to thyroxine is low, urinary 17-ketosteroids are decreased, and low urinary gonadotropin. These manifestations are due largely to the failure of pituitary function. The following table gives a summary of the features of the various hypopituitarisms.

- C General Treatment Acquaint patient with his disease using simple lay terms. Maintain good nutrition and health.
- D Surgery Thymectomy is claimed to benefit some patients.

Prophylaxis

In addition card neostigmine and a syringe are to be carried at all times giving the diagnosis and method of treatment.

THIS PATIENT HAS MYASTHENIA GRAVIS

Name _____

Address _____ Phone _____

If observed to be behaving strangely or if he is found unconscious call for physician or ambulance.

Physician's Name _____

Physician's Address _____ Phone _____

Two ampules of neostigmine and a syringe and needle are in his possession. These must be administered hypodermically into his upper arm immediately.

Management During Pregnancy

Immediately after delivery children of patients with myasthenia may have severe signs of the disease. Immediate treatment with neostigmine is necessary to preserve life. After a few days the symptoms may disappear and the child thereafter does not suffer from myasthenia.

FAMILIAL PERIODIC PARALYSIS (code No. 270 x95)

A disease of unknown etiology characterized by recurrent attacks of flaccid paralysis of the muscles of the trunk and extremities and by a lowering of the serum potassium level during the attack. Immediate relief of symptoms by administration of potassium chloride is usually diagnostic.

Treatment

- A Potassium Chloride U.S.P. B.P. 5-10 Gm (75-150 gr) orally when diagnosis has been made and then 5 Gm (75 gr) bid qid during acute episode as needed to prevent weakness or paralysis.
- B In emergencies only may give prepared solution containing 1 Gm (15 gr) Potassium Chloride U.S.P. B.P. in 30-60 cc distilled water injected very slowly I.V. This is a dangerous procedure (see p. 25).

Prophylaxis

- A Avoid high carbohydrate foods (e.g., candy, honey, sugars).
- B Routine administration of 25% aqueous solution Potassium Chloride U.S.P. B.P. (or enteric coated tablets) 5-12 Gm tid.

GIGANTISM (code No 841 7761)

Pituitary gigantism which is caused by adenoma of the anterior pituitary is principally a result of hypersecretion of the growth factor Growth which occurs primarily at the epiphyses of long bones is symmetrical and generalized and patients may attain a state of severe to high Growth is possible only if the oversecretion of hormone occurs prior to the onset of epiphyseal closure. Late presentation of the pituitary tumor may cause headache, visual disturbances, and elevated serum inorganic phosphorus. One of the best diagnostic signs of activity Glycosuria may be present.

Treatment

- Treatment is aimed at suppressing the pituitary growth hormone.
- A. Endocrine Therapy** If gigantism is found in adolescence and the sella turcica is small, the dose of the tumor suppressant is 1 mg (100 mg) 400-800 mg every 2-4 weeks of Ethinyl Estradiol U.S. 0.1-0.5 mg by mouth daily. Males should be followed for the first 6 months of treatment. The growth rate should be followed. The therapy will prevent further growth by causing loss of the epiphyseal growth plates. Do not use methyltestosterone.
- B. Surgery and X-ray Therapy** If the tumor is not removed surgically, the growth rate should be followed. If the growth rate does not fall, tumor growth surgery must be considered.

ACROMEGALY (code No 841 7762)

Hypersecretion of the growth factor of the anterior pituitary due to adenoma or carcinoma of the gland which develops after the bone epiphyses have fused results in clinical picture of progressive growth of soft tissues and thickening of bones. The disease usually has onset during the 2d-3d decades. It is characterized by enlargement of the jaw bones, supraorbital ridges, hands and feet, thickening of the skin, and visceral enlargement. Elevation of the inorganic serum phosphorus is an important diagnostic feature. If the serum phosphorus is normal, the disease is probably inactive and requires no further treatment.

Treatment

- A. Gigantism (children)** Favorable. It may be cured in some cases with endocrine therapy.

Differentiation of panhypopituitarism from anorexia nervosa (functional hypopituitarism) may be difficult. Psychiatric data bank may be found in both conditions although a history of specific emotional stress or long standing psychiatric symptoms is more suggestive of anorexia nervosa. The nervosa patient is usually more alert and active and more able to withstand stress. The axillary hair is usually not lost in anorexia nervosa but is almost always lost in organic hypopituitarism. The low urinary gonadotropin level (less than 3 mouse units per 24 hrs) of hypopituitarism may be of aid in diagnosis but is not definitive. Improvement following special feeding technique and failure to respond to specific endocrine treatment would further suggest anorexia nervosa.

Treatment

There is no effective pituitary replacement preparation. Therapy must therefore be aimed at correcting the end organ deficiencies. This must be continued throughout life. Almost complete replacement therapy can be carried out with cortisone.

A Cortisone or Hydrocortisone 7.5 to 25 mg per day is usually adequate. This should be given in divided doses 3-4 times daily.

B Thyroid Thyroid (and insulin) should rarely if ever be used in panhypopituitarism unless the patient is receiving cortisone. Because of lack of adrenal cortical function patients are exceedingly sensitive to these drugs. For this reason one should exercise special care in differentiating myxedema from hypopituitarism, often a difficult problem.

Begin with small doses of 15 to 30 mg (1/4-1/2 gr) daily and gradually increase to tolerance 60 to 100 mg (1-1 1/2 gr) is usually adequate.

C Sex Hormones

1 Testosterone May be used in both males and females primarily for its tissue building (protein anabolic) effect. Dosage One of the longer acting parenteral testosterone preparations (see page 40) 100-200 mg every 3-4 weeks. Methyltestosterone L.S.P. B.P. 10 to 40 mg orally in males; female with dose of these drugs a half that for males. If virilizing signs appear in the female the drug should be stopped and these signs will disappear. Virilizing signs usually do not result if the dose is kept under 400 mg per month.

2 Estrogens These get their usefulness in the female for their mild anabolic effect. Their effect on secondary sex characteristics and their possible neutralizing effect on androgens. Diethylstilbestrol U.S.P. or Ethinyl Estradiol B.P. 0.5 to 0.6 mg or Ethinyl Estradiol U.S.P. 0.02-0.5 mg daily or orally.

Note Sex hormones especially estrogens should be employed cautiously in young hypopituitary patients or the epiphyseal will close before maximum growth is achieved.

probably necessary. At times of stress, especially in puberty and during pregnancy and lactation, the requirement rises to high as 200-1000 micrograms (0.2-1.0 mg) daily.

Abnormal Iodine Metabolism

Although the iodine requirements are very slight, in many areas of the United States and elsewhere, these requirements cannot be met from local food and water sources.

A Simple Iodine Lack (Simple Goiter) Endemic goiter or colloid goiter is characterized by enlargement of the thyroid gland and is due to relative or absolute iodine deficiency with a secondary work hypertrophy of the gland. There is often a history of living in an iodine deficient geographic area. Symptoms appear only if the enlargement is sufficient to produce pressure on surrounding structures (esophagus, trachea, or recurrent laryngeal nerve). The endocrine defect is either hypothyroidism or hypofunction and accordingly the BMR, serum protein-bound iodine and cholesterol and diiodine (I^{131}) uptake are usually normal.

B Hypothyroidism In this condition the gland fails to manufacture adequate hormone. This may have various causes: (1) mere complete iodine lack, (2) inflammatory destruction of the gland (thyroiditis), (3) excessive surgical removal, (4) failure of the pituitary to elaborate thyrotropin. In hypothyroidism the BMR, radiiodine (I^{131}) uptake and blood organiodine are frequently low (the latter below 4 micrograms per cent).

C Hyperthyroidism This disease is characterized by an excessive secretion of thyroid hormone. The cause of this is obscure, but it is believed that in many cases the primary difficulty may be excessive secretion of anterior pituitary thyrotrophic hormone. This excessive secretion causes an speeding up of metabolic function, especially the oxidative mechanism of cells. This is a resulting increase of BMR, the blood levels of organic iodine are frequently above 8 micrograms per cent, and the I^{131} uptake is high.

DISEASES OF THE THYROID

NON TOXIC DIFFUSE GOITER (code No. 810.943) (Simple Goiter)

Diagnosis

There is often a history of living in an endemic area. Symptoms appear only if the enlargement is great enough to produce pressure on surrounding structure (esophagus, trachea, or recurrent laryngeal nerve). The BMR and the serum protein-bound iodine and radiiodine (I^{131}) uptake are normal.

Treatment

A Specific Measures

1. Thyroid USP B.P. 60-120 mg (1-2 gr) especially if the goiter is multinodular appears to be of value in about 50% of cases.

DIABETES INSIPIDUS (Due to Unknown Cause code No 842 779)

Destruction of the posterior pituitary or impaired function of the supraoptic nuclei or of tracts from these nuclei in the posterior pituitary (83% of cases being due to tumor) causes the condition known as diabetes insipidus. This is manifested by severe thirst and marked polyuria. A polyuria of over 6 liters per day with specific gravity below 1.006 is highly suggestive of diabetes insipidus. The diagnosis is established by the Hickey Hare test. This test consists of (1) I.V. infusion of hypertonic salt solution which in patients with diabetes insipidus causes an increase in urine flow and (2) administration of a test dose (0.2-0.3 cc) Vasopressin Injection U.S.P. B.P. (Pitressin®) which causes a decrease in urine flow.

Treatment

- A Specific Therapy Vasopressin Tannate N.N.D. (Pitressin Tannate®) 1 cc in oil I.M. is the treatment of choice. It is effective for from 24 to 72 hours. It is usually best to administer the drug in the evening so that maximal results can be obtained during sleep. Patients learn to administer the drug themselves and the dosage is adjusted as necessary. Posterior pituitary secretion inhaled 2-3 times a day may be used but it is quite irritating and absorption is uncertain. The dose varies from 30-80 mg. The aqueous preparation (Vasopressin Injection U.S.P. Pitressin®) is rarely used in chronic treatment because of its short duration of action (1-4 hours).
- B Non-specific Measures Mild cases (or Pitressin® resistant cases) require other treatment than adequate fluid intake.
- C X-ray therapy may be used in treatment of some cases of tumor (e.g. craniopharyngeal granuloma).

THYROID

The thyroid gland utilizes inorganic iodine to form a complex physiologically active thyroxine protein compound that is necessary for normal body function. The normally functioning gland stores the very low concentrations of inorganic iodine present in blood and synthesizes it through diiodotyrosine to thyroxine and possibly triiodothyronine and liberates the active materials probably in combination of the 2 or 3 organic compounds before or during their release of bound to protein. When a excess of inorganic iodine is present in the blood the thyroid cells pick it up and store it in a organification in the colloid of the follicle. Under the influence of the anterior pituitary this colloid material is absorbed with its active principle into the bloodstream. The utilization of inorganic iodine is quite constant in health ranging from 4-8 mg. per 100 cc of blood.

The requirements for iodine are very slight and difficult to estimate. About 20-200 (0.02-0.2 mg.) micrograms per day.

1. Patient with severe myxedema myxedema heart disease elderly patient with hypothyroidism with other associated diseases CAUTION Begin with small doses 8-15 mg ($1/8$ to $1/4$ gr) daily for 1 week and increase dose every week by 15 mg ($1/4$ gr) daily up to a total of 100 to 200 mg ($1\frac{1}{2}$ to 3 gr) daily. This dosage should be continued until signs of hypothyroidism have virtually disappeared symptoms appear then stabilize dosage so as to maintain the B.M.R. on protein bound iodine at normal level below the level of toxicity (see below under Hyperthyroidism).
2. Patients with early hypothyroidism may be treated with large doses 30 mg ($1/2$ gr) daily increasing by 30 mg ($1/2$ gr) every week to the limit of tolerance.
3. Chronic maintenance: Each patient's dose must be adjusted to obtain the optimum effect. Most patients require 50 to 130 mg (1 to 2 gr) daily to maintain an optimum dosage. Amount determined by following protein bound iodine B.M.R. but clinical judgment is still the best guide.
4. When required, prescribe SSKI or Sodium L-thyronine N.N.D. (L-thyronine Cytomel®) may be employed. Begin with very low dose because of its rapid action. Begin with 0.005 mg and increase slowly (see page 415).

B. Useless Use of Thyroid

1. Questionable diagnosis: Many patients can tolerate above 200 mg (3 gr) daily of thyroid. The diagnosis of hypothyroidism should be questioned. No malindividual and obese individuals can tolerate doses up to 300 to 500 mg ($4\frac{1}{2}$ to $7\frac{1}{2}$ gr) daily without change in B.M.R. or development of toxic symptoms.
2. Nonspecific use of thyroid: The use of thyroid medication as nonspecific stimulant therapy is limited only to the condition in which has been shown that the drug usually employed (100 to 200 mg or $1\frac{1}{2}$ to 3 gr daily) is ineffective in altering the metabolism of a malindividual.

HYPERTHYROIDISM

- It has been found that many patients with hyperthyroidism according to the gross anatomical characteristics of the gland are:
1. Diffuse Toxic Goiter (when associated with exophthalmos, Grave's disease) (see No. 810 943 5)
 2. Nodular Toxic Goiter (see No. 810 952 6)
 3. Hyperthyroidism without Goiter (see No. 810 771)
- However, in the treatment of hyperthyroidism, it is important to recognize the fact that the early differential clinical and physical signs of the disease are not the common findings of hyperthyroidism.

Diagnosis

A. Symptoms: Nervousness, irritability, fatigue, weight loss in spite of excessive appetite and food intake.

B. Signs

1. Patient may feel all his muscles are weak and moist skin.

- 2 Iodine therapy (early) If the enlargement is discovered early it may disappear completely with adequate iodine. Five drops daily of saturated solution of potassium iodide or Strong Iodine Solution U S P Aqueous Solution of Iodine B P (Lugol's solution) in 1/2 glass water is adequate therapy. Continue therapy until gland returns to normal size then keep on maintenance dosage or use iodized table salt.
 - 3 Iodine therapy (late) If the enlargement is of long standing, iodine therapy as above may be used but much regression in the size of the gland should not be expected.
- Indications for Surgery
- 1 Signs of pressure If signs of local pressure are present the gland should be removed surgically.
 - 2 Potential malignancy Surgery should be considered for any thyroid gland with a single nodule for the chances of a single nodule being malignant are quite high. This is particularly true in younger people and when there is no response to treatment.

Prophylaxis

With an intake of 100-200 micrograms of iodine daily this condition should not occur. During times of stress (puberty, pregnancy and lactation) the upper limits of this dose may prove necessary. This amount is satisfied by 1-2 Gm (15-30 gr) of iodized salt (1:5000-1:10,000 parts iodine) daily.

HYPOTHYROIDISM (code No 810 7722)

Diagnosis

A Symptoms Early weakness, easy fatigability, cold sensitivity.

B Signs

- 1 Early These are few and may be difficult to find. Dry skin and hair, brittle nails, and menstrual disturbances are suggestive.
- 2 Later Hair tends to fall out (especially eyebrows), sweating diminishes, face becomes puffy (especially about the eyes), then non-pitting edema spreads to the rest of the body. Patient may develop anemia and heart disease.
- 3 Obesity is an uncommon finding in true hypothyroidism.

C Laboratory Diagnosis

- 1 Low BMR A BMR below -30% is suggestive but not diagnostic of hypothyroidism. A low TMM does not necessarily mean hypothyroidism, this is especially true in obese patients. (See Obesity p 398).
- 2 Serum iodine A low protein bound iodine of under 3.5-4.0 micrograms per cent (depending on the method used).
- 3 Decreased radiiodine (I^{131}) uptake (below 10% in 24 hours).
- 4 Other significant findings include elevated blood cholesterol (above patient's normal) and in severe cases anemia.

Treatment

A Specific Therapy Thyroid USP B P is the preparation of choice. Initial dosage varies with the severity of the hypothyroidism.

drug continued the B M R will continue to fall until the patient becomes myxedematous

(1) The drug appears to be ideal except for 2 factors

(a) Drug fits reactions especially granulocytopenia. This apparently happens very infrequently with propylthiouracil and can be anticipated. The patient examined weekly and weekly blood count taken. If the WBC fall below 4500 or if less than 45% granulocytes are present therapy should be discontinued. Other reactions are drug fever and rash.

(b) The second objection is of a technical nature since the gland may contain hypoplastic and vascular spaces. Removal is more difficult. Because of this combined the spray of propylthiouracil and iodine is probably the method of choice in preparation for thyroidectomy (see below).

(2) Dose. The drug is usually continued and surgery deferred until B M R is normal. There is no need to rush surgery there is no danger of escape as with iodine.

(a) In severe cases 100-200 mg q i d is generally required.

(b) In rare cases especially with very large glands the dose may be increased.

(c) In mild cases 100 mg b i d may be sufficient though the large dose is a common habit.

b. Methimazole USP. Almost the same as propylthiouracil in its mode of effect and dosage. Toxic effects may be more frequent.

Methimazole USP (Tapazole). The action of the drug is similar to that of propylthiouracil. The dosage is about 1/10-1/15 that of propylthiouracil. The average dose 10-15 mg every 8 hours. The small dosage is no guarantee against side effects which may be more common with the drug than with propylthiouracil.

d. Iodine USP and N N D (Iodine). The iodine is the most reliable method of giving iodine. Although the formula is published the preparation is not standardized. The white crystalline substance is well absorbed postoperatively. Dose 100-300 mg i d to q d.

2. Iodine. Has been definitely established by the dosage of 5-10 drops of Strong's Iodine Solution USP. Aqueous solution of Iodine B M (Lugol's solution) is used in the preparation of iodine with the purpose of (a) blunting the B M R has been reported to be 20% the normal and symptomatic treatment is delayed and the patient is brought to the point of surgery with iodine.

A few patients may not respond particularly those who have iodine deficiency.

E. If the iodine is too long without surgery the gland may become so large that the patient is not a candidate for surgery.

- 3 Fine tremor of extremities usually present in severe cases
- 4 Marked weight loss and emaciation
- 5 Goiter (at times a bruit may be heard over gland)
- 6 Exophthalmos may be marked
- 7 Cardiovascular findings vary most common is tachycardia but in older patients especially with long standing hyperthyroidism cardiac failure and auricular fibrillation are not uncommon

C Laboratory Findings

- 1 Elevated B.M.R. may be present in other conditions such as fever malignancy (especially leukemia)
- 2 Elevated hormonal iodine Above 8 mcg % is suggestive but this may be seen in pregnancy with excessive administration of thyroid and after therapeutic or diagnostic use of iodine containing organic compounds (e.g. drugs used for gallbladder or kidney visualization)
- 3 Increased ^{131}I uptake may be diagnostic In doubtful cases with elevated ^{131}I uptake lack of depression of uptake on thyroid or sodium iothyronine medication may be diagnostic
- 4 The blood cholesterol level may be low

Treatment

Treatment is aimed at stopping the excessive secretions of the thyroid. Several methods are in use and the method of choice is still open to debate and varies with each case. The most widely accepted method however is adequate preparation followed by subtotal surgical removal.

A Subtotal Thyroidectomy This is probably still the method of choice since it demonstrates the least in follow up cases. Adequate preparation is of the utmost importance. One or two drugs are generally necessary for adequate preparation iodine and/or one of the thiouracil group of drugs.

1 Thiouracil (drugs of choice) Recently several thiouracil drugs or similar derivatives have been introduced. They are Propylthiouracil U.S.P. B.P. Methylthiouracil U.S.P. Methimazole U.S.P. dose continuing on one in the molecul. Iothiouracil Sodium N.N.D. (Itum 15). The modes of action of the first three are probably identical that of iothyronine is still not entirely clear.

a Propylthiouracil U.S.P. B.P. This drug has been most widely used and appears to be the least toxic. It is the thiouracil preparation of choice. The mode of action of this drug is such that when given in adequate dosage it prevents the thyroid gland from incorporating inorganic iodine into its organic (hormonal) form. This effect is very rapid (within a few hours) and continues as long as the drug is given. The gland attempts to attempt to manufacture the hormone (resulting in hyperplastic growth becomes more so) but none is made. Because of this the B.M.R. invariably falls the rate of fall depending upon the total quantity of previously manufactured protein bound iodine available from the gland or in the circulating blood. (More protein bound iodine is present if iodine has previously been given.) The average time required for the B.M.R. to return to normal is about 4-6 weeks. If the

possibility of carcinogenesis (which has not yet been observed) and the possibility that an early carcinoma which might be removed surgically may remain undetected. Because of the above factors its use should generally be limited to older age groups (40 and above).

D C t s Iodine Therapy. In the past this method was used in some select mild cases of hyperthyroidism with fair results; however because of the danger of escape and because of the discovery of propylthiouracil iodine should be used only for preparation.

E X ray Therapy. Has been used in skull disease with good results as a substitute for surgery but because of the time necessary to obtain complete effect (3-6 months) this method of therapy should be reserved for selected cases. It is rarely indicated when 131 I is available.

F General Measures

1. **Rest.** The patient with hyperthyroidism should be treated especially in severe cases as in preparation for surgery. With the advent of propylthiouracil mild cases are being treated as ambulatory patients. However, usually best results are obtained.

2. **Diet.** Diet should be high in calories and protein and vitamins. The quantities of food are generally in negative nitrogen balance and the excess foods and vitamins because of the increased metabolic needs. Supplemental vitamin B complex should generally be employed.

3. **Sedation.** When feasible the patients rest is very necessary. Sedation is always helpful and very large quantities may be necessary to get to sleep. Phenobarbital, U.S.P. Phenobarbitalone B.P. 30 mg (1/2 gr) 3-5 times daily may be necessary.

4. **Testosterone.** This drug has been shown to be of value in restoring positive nitrogen balance in these patients. May administer 25-50 mg of testosterone 3 times a week. Do not use methyltestosterone in hyperthyroidism as it aggravates the condition.

G Treatment of Complications

1. **Exophthalmos.** The treatment of exophthalmos is still a problem. Although it may be detected in the early stages of the disease, the evidence is still inconclusive. It has been shown that exophthalmos is due to edema of the orbital tissues (muscle connective tissue, etc.). Removing the thyroid gland (by thyroidectomy or administration of propylthiouracil) does not usually help this condition. May give iodine to the patient to inhibit the thyroid gland. It has been suggested that this should be followed by thyroidectomy. The inhibition of the thyroid gland allows the antithyroid pituitary hormone to act on the thyroid gland and give the thyroid condition. Some investigators believe that exophthalmos occurs with hyperthyroidism because the thyroid secretion in hyperthyroidism may be qualitatively abnormal and because of this abnormality.

c It is generally impossible to bring the B M R to normal with iodine

3 Combined propylthiouracil iodine therapy The advantage of this method is that one obtains the complete inhibition of thyroid secretion with the involuting effect of iodine This can be given in 2 ways

a Propylthiouracil followed by iodine This appears to be the method of choice Begin therapy with propylthiouracil about 10-21 days before surgery is contemplated (usually B M R about +20) begin the iodine and continue for 1 week after surgery

b Concomitant administration of the 2 drugs from the start in dosages as for the individual drugs i.e. 100-200 mg propylthiouracil q i d and Strong Iodine Solution U.S.P. Aqueous Solution of Iodine B.P. (1 g l s solution) 10-15 drop daily

II Continuous Propylthiouracil Therapy (Medical Treatment)

Control of hyperthyroidism with propylthiouracil alone without surgery has been advocated by some

1 The advantage is that it avoids the risks and postoperative complications of surgery e.g. myxedema hypoparathyroidism

2 The disadvantage is the remoteness of possibility of toxic effect (see p 371) plus the necessity of watching the patient carefully for signs of hypothyroidism Since the advent of propylthiouracil it appears that the possibility of toxic reaction is slight The patient must report to the physician if fever, sore throat or dysphagia develop

3 Dosage

a Begin with 100-200 mg t i d to q i d and continue this dosage until the B M R is normal and all signs and symptoms of the disease have subsided then place the patient on a maintenance dose of 50-75 mg daily keeping the B M R or protein bound iodine to avoid hypothyroidism

b An alternative method is to continue with doses of 50-200 mg t i d to q d This will bring the patient to hypothyroid level keep the B M R or protein bound iodine normal with thyroid (This may be the preferred treatment of exophthalmic goiter see page 373)

c Duration of therapy The duration of therapy and recurrence rate have not been completely worked out However at present it would seem that of the patients kept on propylthiouracil between 6 and 12 months (the dosage slowly decreased) about 50 to 70% will show no recurrence Increasing the duration of therapy to about 2 years or more does not increase the cure rate

C Radioactive Iodine (131) The administration of radioiodine has proved to be an excellent method for ablation of overfunctioning thyroid tissue The rationale of treatment is that the radioiodine being concentrated in the thyroid will destroy the cells that concentrate it Its use may be lifesaving in case of thyroid carcinoma when the cancer tissue cannot take up iodine Because special techniques are necessary to measure and handle the 131 the method is still generally limited to large medical centers The only objections to date

hyperpyrexia tachycardia and C.N.S. hyperirritability and delirium. The cause is uncertain but absolute or relative adrenal cortical insufficiency may be important.

- a General treatment. Attempt to control the hyperpyrexia with cold packs and the hyperirritability with sedation.
- b Specific measures. There is no certain specific therapy. However, the use of large doses of corticotropin (ACTH) and the corticosteroids (p. 424) may be life saving. The administration of large doses of sodium iodide 1-2 Gm (15-30 gr) i.v. and repeated every 24 hours has been advocated.

DISORDERS OF CALCIUM AND PHOSPHORUS METABOLISM

NORMAL CALCIUM AND PHOSPHORUS METABOLISM

Calcium

- A Intake. Calcium is ordinarily derived from the diet. Average adult dietary intake is 0.5-0.8 Gm ($7\frac{1}{2}$ -12 g) daily and is normally adequate. During pregnancy and lactation the requirements are higher, the range being 1.3-3.0 Gm ($22\frac{1}{2}$ -43 gr) daily.
- B Absorption. Calcium is absorbed in the small intestine. Several factors influence calcium absorption:
 - 1 Vitamin D is needed for proper absorption.
 - 2 Presence of fatty acids or certain minerals (magnesium, potassium) may interfere with calcium absorption.
 - 3 pH of intestine. Increased acid favors absorption.
 - 4 Disease of the GI tract (e.g. chronic diarrhea, pancreatic deficiency) which disturbs motility and interferes with absorption.

Intestinal calcium metabolism

- 1 Blood. Calcium exists in plasma in 2 fractions: a diffusible fraction (45-50%) containing the ionizable active material and a non-diffusible which is bound to the globulins. When blood calcium values are reported, these are the total (diffusible and non-diffusible) calcium and may be low when protein level is low. But the physiologically active ionizable portion may be normal though always determined when serum albumin is determined.
- 2 Bone. Bone is a very actively metabolizing tissue. There is constant breakdown or resorption (osteoclastic activity) and constant new bone matrix formation (osteoblastic activity) and constant calcifying of this matrix. The activity of building pathologic bone (osteoblastic activity) is associated with the presence of alkaline phosphatase enzyme and its liberation into the blood this enzyme is increased when osteoblastic activity is increased.
- 3 Excretion. Calcium is excreted in the urine and stools. Most of the stool calcium is derived from unabsorbed dietary calcium and varies with caloric intake and absorption. The urinary calcium varies with the amount absorbed but the variation is not as great as with the stool calcium.

secretion does not have any pituitary depressing effect. Therefore it would seem rational to treat this condition by giving thyroid orally.

- a **Thyroid dosage** Immediately after surgery or after B.M.R. has returned to almost normal ($+20\%$) with propylthiouracil therapy begin giving thyroid 100-200 mg daily. Give dosage adequate to maintain B.M.R. at about $+20\%$. This therapy should be used whenever there is a tendency for progression of the exophthalmos although it is not always effective.
 - b **Physical protection of eyes** Dark glasses protect from dust eye shields tarsorrhaphy and other measures may be necessary. Ophthalmological consultation should be requested.
 - c **Corticotropin (ACTH) or cortisones** The use of these agents in large doses has been proposed. In some cases they have proved helpful. They probably act by reducing the inflammatory reaction which occurs in the periorbital tissues.
 - d **Surgery of malignant exophthalmos** Every patient with exophthalmos should have actual and periodic measurements made with an exophthalmometer. One should not rely upon clinical judgment to determine whether or not exophthalmos is present or progressing. In severe progressive cases where corneal edema, limitation of extraocular muscle movements and failing vision occur it becomes practically a surgical emergency to save the eyesight. The operation of choice is orbital decompression.
- 2 **Cardiac complications** Whether or not thyrotoxicosis is itself a cause has not been settled. However a number of cardiac complications are at times associated with hyperthyroidism.
- a **Tachycardia** Some degree of tachycardia is always found if normal rhythm is present in thyrotoxicosis. This requires only the treatment of the thyrotoxicosis.
 - b **Congestive failure** This tends to occur in long standing thyrotoxicosis especially in the older age groups. Therapy is the same as for congestive failure from any cause. Digitalis seems to be effective in congestive failure associated with thyrotoxicosis (see p. 197).
 - c **Atrial fibrillation** May occur in association with thyrotoxicosis. Treatment as a symptomatic fibrillation but do not try to convert the atrial fibrillation in a toxic patient. Most cases will return to normal rhythm soon after toxic symptoms subside. However fibrillation remains for 2 weeks after surgery or for 2-4 weeks after B.M.R. has returned to normal using propylthiouracil therapy one should observe of quinidine to convert to a normal rhythm (if no contraindications are present) (see page 200).
- 3 **Crisis or storm** Fortunately this condition is rare with modern forms of therapy. It occurs now mainly with inadequately treated iodine deficiency states immediately after subtotal thyroidectomy. It is characterized by

la d down in adequat amounts however the matrix that is dep s ted is lified normally

Blood.

A Calcium Dioxide (Normal values 9-11 mg %)

- 1 Hypocalcaemia Observed in a number of abnormal conditions. If severe, the following results:
 - a Hypoparathyroidism
 - b Osteomalacia: if severe of whatever etiology (e.g. that associated with steatorrhea as a result of improper intestinal absorption)
 - c Due to phosphorus retention by the kidney (e.g. nephritis) which causes an elevated serum phosphorus

2 Hypo albumia

- a Hyp rparathyroidism
- b Multiple myeloma or other diseases with hyperproteinemia
- c Overload with dihydroxycholesterol (A T 10) or vitamin D

B Phosphorus Dieters (Normal adult values 2-4 mg %)

- 1 Hypophosphatemia Occurs in hypoparathyroidism and may occur in osteomalacia but low serum phosphate value is a rare feature of hypophosphatemia is the de Toni Faconi syndrome
- 2 Hyperphosphatemia Serum phosphate level is elevated in kidney failure and in some malignancies. The high serum phosphate levels are found in multiple myeloma which causes phosphaturia

HYPERPARATHYROIDISM

[Adenoma, code No 820 8046A] (Hyperplasia, code No 8 ■ 943 6)

(Osteitis Fibrosa Cystica Generalized code No 200 773)

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CAUTION After surgery patient may in the course of several hours develop tetany as a result of rapid fall of blood calcium. The calcium level may only fall to the normal range but due to the rapid alteration in level tetany may be precipitated. The possibility of hypoparathyroidism (see below).

B ce Fluids. Large fluid intake is necessary so diluted urine will be retained & minimal tubular formation of calcium phosphate

Phosphorus

Phosphorus is involved in many metabolic reactions and in some of these it acts with calcium. In general there is an inverse ratio between calcium and phosphorus in the blood. When calcium is high phosphorus usually is low and vice versa.

A Intake Phosphorus is a rich constituent of many food stuffs and shortages are unknown except in starvation.

B Absorption Most phosphorus is absorbed as simple inorganic phosphorus.

C Intermediary Metabolism (Blood phosphorus level is usually from 2 to 4 mg % in adults.)

1 Bone Phosphorus moves with calcium into bone to form calcium phosphate salts.

2 Phosphate ion (PO_4) is very important in many metabolic reactions and the potential energies of these phosphate bonds especially with carbohydrate are the sources of much of the entire body energy. In carbohydrate metabolism PO_4 forms hexose phosphate bonds and in fat metabolism it acts through the phospholipids. It also participates in nucleic acid metabolism.

ABNORMAL CALCIUM AND PHOSPHORUS METABOLISMBone

Most abnormal calcium and phosphorus metabolism is concerned with abnormal osteogenesis. Therefore to understand the therapy of the disorders of calcium and phosphorus metabolism one must understand the abnormal physiology and the physiological differences between the metabolic diseases of poorly calcified bone.

A Osteomalacia A disorder of calcium or phosphorus metabolism of such nature that there is absence of or poor deposition of calcium salts in the normally formed osteoid matrix. The weakened bone therefore is subjected to many mechanical stresses which act as stimulants to the osteoblasts to lay down more osteoid matrix. This increased osteoblastic activity leads to an elevated serum alkaline phosphatase. The serum calcium and/or phosphorus may be depressed or normal. The product of calcium times phosphorus is generally decreased.

B Osteitis Fibrosa Cystica or Cystica A disorder of calcium or phosphorus metabolism in which there is increased resorption of bone due to hyperparathyroidism. The excessive parathyroid hormone probably has a dual action: it diminishes renal tubular reabsorption of phosphorus causing excessive phosphorus loss and calcium phosphate is mobilized from bone raising serum calcium which then spills over in urine. There is probably direct stimulation of osteoclast by the hormone. Since the bone is weakened there may be added stresses and strains as in osteomalacia which may stimulate osteoblastic activity and cause a high serum alkaline phosphatase. This results in a high serum calcium, a low serum phosphorus and a high calcium and phosphorus excretion in the urine.

C Osteoporosis Strictly speaking osteoporosis is not a calcium or phosphorus metabolic disorder. It is due to a decrease in the osteoblastic activity and hence the protein matrix is not

phosphorus and help restore normal level of bone mass in this condition.

- 6 Aluminum hydroxide gel may be employed to help with chronic phosphorus (see p 362)

OSTEOPOROSIS (Senile Osteoporosis code No 200 798)

Osteoporosis occurs most commonly in postmenopausal patients. It is also found associated with other conditions leading to general feed and atrophy e.g. malnutrition particularly due to low protein intake. Cushing's syndrome causes use of corticosteroids (ACTH) or other corticosteroids atrophy (when a stimulus to osteogenesis is absent) causing a rapid loss of bone.

The first complaint is usually backache. There is x-ray evidence of rarefaction especially in the lumbar vertebrae and pelvis and often collapse and fracture of vertebral bodies. Other pathological fractures may occur. The blood alkaline phosphatase and alkaline phosphatase are normal.

Treatment

- A Specific Measures Vary with the cause but combined hormone therapy usually indicated

1 Postmenopausal (mostly in females)

Estrogen may be given in stimulating osteoblasts before beginning estrogen therapy in a postmenopausal woman by reform cervical pelvic examination to rule out neoplasia or other abnormality and warn patient or a relative that vaginal bleeding may occur. Administer estrogen daily except first 5 or 7 calendar days of a 1 month and then stop at cycle.

(1) Diethylstilbestrol U.S.P. Stilboestrol B.P. 0.5 20 mg daily as tolerated

(2) Ethinyl Estradiol U.S.M. 0.02 & 0.03 mg daily as tolerated.

- b Testosterone For its protein anabolic effect and hence its tendency to lay down bone matrix testosterone may be used in addition to estrogens. Give 10-20 mg methyltestosterone orally. Avoid overdosage in female excites embryonic appearance of male and yes sexual harassment. How often this will grow is difficult to predict.

2 Old age and idiopathic As for postmenopausal both treatment and estrogen should be used in both males and females

- 3 Protein with malnutrition Adequate diet of protein important. However the hormone may be used as before if response to diet alone is poor.

4 Estrogen deficiency (see p 363)

II General Measures

- 1 Diet Should be high protein high calcium (milk and milk products desirable). Vitamin supplement especially vitamin D 2000-5000 unit daily may be given.
- 2 Activity Patient should be kept active and in bed by use of hip splint.

HYPOPARATHYROIDISM (Unknown Cause code No 820 x10) (Injury due to Operation code No 820-415.x)

A deficiency of parathyroid hormone usually occurring post operatively following thyroidectomy or surgery for parathyroid tumor or hyperplasia. It is characterized by muscle weakness, irritability, tetany, a low blood calcium, high or normal blood phosphorus, normal phosphatase, and normal bones by x ray (except after removal of parathyroid tumor). Cataracts may occur particularly in young persons.

Treatment

- A Emergency Treatment for Acute Attack (Hypoparathyroid Tetany)** Usually postoperative and requires immediate treatment
- 1 Calcium Chloride U S P B P 5 10 cc (1 2 1/2 dr) of 10% solution I V slowly until tetany ceases or Calcium Gluconate Injection U S P B P 10 30 cc (1/3 1 oz) of 10% solution I V may be given 10 30 cc of either solution may be added to 1000 cc of 5% glucose in water or saline and administered by slow I V drip. The rate should be so adjusted that hourly determination of urinary calcium by means of the Sulkowitch test will be positive.
 - 2 Parathyroid Injection U S P 50 100 units (1/2 1 cc) I M or s.c. 3 5 times daily as necessary to prevent tetany. Do not use parathyroid hormone for over one week because refractory state tends to develop rapidly. Use only as long as absolutely necessary. A usually parathyroid hormone is rarely ever used; it is not very practical and usually not necessary.
 - 3 Calcium salts should be given orally as soon as possible. calcium gluconate 4 Gm (60 gr) q i d or calcium lactate or calcium chloride 2 3 Gm (30 45 gr) q i d.
 - 4 Dihydroxycholesterol N N D (Hytakerol®) should be given as soon as a small calcium is begun. Begin with 4 10 cc (1 2 1/2 dr) of oily sol (1 25 mg per cc) orally daily for 2 4 days then reduce dose to 1 2 cc daily for 1 3 weeks and then determine maintenance requirements.
- B Maintenance Treatment**
- 1 High calcium low phosphorus diet (omit milk)
 - 2 Calcium salts as above may be continued (except chloride)
 - 3 Dihydroxycholesterol N N D (Hytakerol®) 1/2 1 cc daily or 3 times weekly to maintain blood calcium at normal level.
 - 4 Calciferol U S P 1 5 mg daily. In some cases up to 7 or 8 mg calciferol daily may be substituted for dihydroxycholesterol. Vitamin D action is probably similar to that of dihydroxycholesterol and it can certainly be substituted adequately. Unusually. The initial action of vitamin D appears to be slower. However the cost to the patient is less than using dihydroxycholesterol and the margin of safety is probably greater. Regulate the dose by daily Sulkowitch test which should run 1 2+.
 - 5 In some patients Probenecid N N D (Benmid®) in doses of 2 4 Gm (30 60 gr) daily has been shown to block the tubular reabsorption of phosphate and hence to lower serum

TreatmentA Specific Therapy (Chronic Cases)

1 Cortisone or hydrocortisone. The drugs of choice at present. Most Addisonian patients are well maintained on 8-25-25 mg (4/10-3/8 gr) daily given in divided doses 3 to 4 times daily orally. On this dose most of the metabolic abnormalities are corrected. Most patients, however, do not obtain sufficient salt-retaining effect and require D O C A or fludrocortisone supplementation or intradialytic salt.

2 Desoxycorticosterone Acetate (D S P) or oxycortone Acetate (B P (D O C A)). This drug controls electrolyte balance and has no other significant metabolic effect.

1 M administration of D O C A may be used initially but is unreliable therapy. The usual dose for supplementation is 1-4 mg daily. When the response has been adequate (see below) change to bucaluse.

b Bucaluse of D O C A. One tablet daily at bedtime titrated twice daily will give adequate supplementation. The tablet is placed between the cheek and teeth and allowed to dissolve (see p 418).

Desoxycortisone dimethyl acetate 25-75 mg 1 M once monthly may be substituted for D O C A (25 mg 1 M once monthly = 1 mg D O C A in 10 per day).

3 Fludrocortisone Acetate (N N D). This new drug is very potent in inducing sodium retention. It is effective orally. Dose is 0.1-0.25 mg daily once every third day (see p 424).

CAUTION: When using D O C A or fludrocortisone, avoid excessive dosing. Do not have patients on low potassium diets when giving these drugs for the first time; development of potassium deficiency.

4 Sodium chloride (large dose) (5-20 Gm daily) may be used to supplement corticosteroid in the absence of D O C A or fludrocortisone.

B General Measures

1 Diet. Give high carbohydrate high potassium diet. Frequent small feeds tend to be better tolerated than 3 large meals.

2 Avoid exposure to infection and to all infections immediately and vigorously.

3 Methyltestosterone 10-20 mg daily orally or testosterone propionate in oil 10-25 mg 1 M 3 times weekly is often helpful for the protein anabolic effect and for the hypoparathyroidism of well-being; it induces in the debilitated patient.

Criteria of Adequate Therapy and OverdosageA Adequate Therapy

1 Return of blood pressure to normal. May require up to 3-4 months with adequate therapy.

2 Maintenance of normal fasting blood glucose level.

3 Return of plasma electrolyte to normal level.

4 Weight gain (usually due to fluid).

5 Improvement of appetite and of general strength.

6 Increase in level of heart to normal.

B Overdosage. Must be watched for and avoided very carefully especially in patients with cardiac or renal compensation.

1 Signs and symptoms of corticosteroid excess (see p 423).

2 Development of peripheral edema or excessive weight gain.

OSTEOMALACIA (code No 200 7642)

Osteomalacia results from calcium deficiency due to any cause. In adults these include vitamin D lack or resistance (rare) and sprue syndrome or pancreatic disease. Chronic renal disease may also produce osteomalacia but more generally produces secondary hyperparathyroidism.

Rickets (code No 010 764) is the childhood type due to inadequate intake of vitamin D. Laboratory findings include a low or normal serum calcium or a low or normal serum phosphorus (except in renal disease where it may be elevated) and most characteristically an elevated phosphatase.

Treatment

A Specific Therapy

- 1 Rickets Vitamin D even in small doses is effective. 2000-5000 units daily are adequate.
- 2 Adult osteomalacia and Milkman's syndrome Vitamin D is specific but very large doses are necessary to overcome the absorption defect. Give until an effect is noted on blood calcium. Usual dose is 25 000-100 000 units daily. Doses up to 300 000 units daily may be necessary but if the doses are over 100 000 daily they must be used cautiously.
- 3 Pancreatic insufficiency (see p 289). Adequate replacement therapy is of paramount importance. High calcium intake and vitamin D 2000-10 000 unit daily are also of value.
- 4 Sprue syndrome Folic acid and vitamin B₁₂ appear to be of value (see p 226).
- 5 Some are forms of renal disease. Treatment is aimed at the altered renal physiology.

B General Measures. High calcium diet and calcium gluconate, calcium lactate or calcium chloride 5-20 Gm (1-5 dr) daily.

ADRENAL CORTEX

ADDISON'S DISEASE (Adrenocortical Insufficiency)

(Due to Tuberculosis code No 860 123.x)

(Undetermined Cause code No 861 782)

A disease due to lack of secretion of adrenal cortex caused by tuberculous destruction of the gland, surgery or undetermined factors. It is manifested by asthenia, anorexia and other C/D disturbances, hypotension and pigmentation usually brownish of the skin and mucous membranes. This pigmentation is mainly accentuation of already pigmented areas and a deposition of pigment in skin creases.

The laboratory findings include a low blood sugar, increased insulin sensitivity, low blood sodium and chloride, elevated potassium, elevated N/P/N and a positive water test. There is a decrease of 17 ketosteroids and corticosteroid excretion and a lack of response to adrenocortical tropic hormone in primary Addison's disease.

- 3 Development of hypertension
- 4 Increase of diameter of heart above normal
- 5 Development of signs of potassium deficiency (weakness followed by loss of muscle power and finally paralysis) especially if patient is on a low potassium diet

Treatment of Adrenal Crisis (Acute Adrenal Insufficiency)

The adrenal crisis is an emergency. The patient must be treated vigorously and observed constantly until well out of danger. *Overtreat rather than undertreat.*

A. Severe Crisis

1. Emergency treatment

- a. Anti shock measures. Use appropriate adjunctive measures (see p. 27) especially plasma vasopressor drugs and oxygen. Do not use narcotics or sedatives.
- b. Hydrocortisone. Administer hydrocortisone hemisuccinate (Solu Cortef®) 100 mg dissolved in 2-10 cc water I.V. over about 1 minute. Follow with hydrocortisone free alcohol (Infusion Concentrate Hydrocortisone® Cortef® Sterile solution) or Solu Cortef® 100 mg in 1 L 5% glucose in physiological saline solution by I.V. infusion over a period of 2 to 8 hours. If Solu Cortef® is not available initially administer the hydrocortisone free alcohol 100 mg in 1 L of 5% glucose in physiological saline I.V. over a period of 1 to 3 hours. An additional 50-100 mg of hydrocortisone may be added to subsequent infusions during the first 24 hours if necessary. (If parenteral hydrocortisone is not available give aqueous adrenal cortical extract 25-50 cc I.V. immediately and follow with 100-200 cc aqueous adrenal cortical extract in 1000 cc saline dextrose solution.)
- c. Cortisone acetate. Give initial cortisone acetate 10-20 mg I.M. in four different sites (total 40-100 mg). Follow with single injections of cortisone 25-50 mg I.M. every 6 hours and gradually lengthen intervals of administration to 25 mg every 8 hours.
- d. Subsequent parenteral fluid. After the first I.V. infusion mentioned above is completed the patient should be followed intravenously by 1000 cc 10% glucose in physiological saline solution (including additional hydrocortisone as mentioned above). The total fluids in the first 24 hours and daily thereafter should not be greater than 3 liters in order to avoid excessive administration of sodium.
- e. Anti-infective measures. If infection is present treat intensively with indicated antibiotics.

2. Convalescent treatment. When patient is able to take food by mouth place on oral cortisone 12.5-25 mg every 6 hours and reduce dosage to maintain normal levels as needed.

B. Moderate Crisis. If the patient's physical condition does not appear to be critical and is not associated with a significant degree of shock the treatment outlined above may be modified by appropriate reduction in dosage. However, it is generally best to overtreath the patient in moderate crisis during the first 24 hours rather than ask undertreatment.

C. Complications Arising During Course of Treatment of Crisis

MALE HYPOGONADISM

Etiology

Failure of the gland may result from several causes. This failure may be primary (due to testicular disease) or secondary ■ malfunction of other glands most often the pituitary or thyroid.

Diagnosis

The physiologic diagnosis of the etiology of hypogonadism (e.g. primary or secondary) is usually based on laboratory tests

Type of Hypogonadism	Urinary ITK test	Urinary Gonadotropins
Primary	Low or normal	Elevated
Secondary Pituitary	Usually low but may be normal	Very low
Androsexual Nervous	Low or normal	Low or normal Not significantly as low as pituitary type
Thyroid (Thyroid?)	Low or normal	Low

Many clinical syndromes have been described but basically they all fall into one of two categories. The differences are outlined below.

- A. Primary Type** Should not be diagnosed before 18 years of age. The failure of development is normal testicular function and is manifested by small or absent testis, small penis, lack or diminution of virilization and pubic hair, lack of masculine development of a young boy, the chronologic age. Some of the pituitary gland the with Kluver-Bucy syndrome may have been how to have found a characteristic pattern.
- B. Pituitary Type** Location of normal testicular function (glutathione and testosterone and malhormone). Apparently the normal testis of testicular function, the male is not generally as sensitive to androgenic stimulation as the female. The function of ovarian function, the female. However, some men may have the rapid decline of function with the development of gonorrhea as a result of gonorrhea (p. 388).

Treatment

Testosterone (the male sex hormone) is the drug used for replacement therapy in the male. (For preparation available see p. 420.)

A. Primary Hypogonadism Adequate treatment with therapy can

continue the I M and possibly the oral dosage during and after surgery. After surgery gradually decrease the dose and maintain the patient as a chronic Addisonian patient (see p. 381). Because of danger of precipitating heart failure, care must be exercised to avoid excessive fluids and sodium.

2. X-ray therapy to the pituitary may be of value only in rare cases of hyperplasia.

■ Ce er i Mea res

1. Diet: High protein diet should be given although dietary attempts to correct the negative nitrogen balance are doomed to failure.
2. Hormones
 - a. Testosterone has been of value in reversing the negative nitrogen balance. For this testosterone propionate in oil 25-50 mg daily I M has been found necessary.
 - b. Insulin is usually of little or no value in controlling the glycoluria and hyperglycemia. Insulin is usually unnecessary as the diabetes is quite mild.

VIRILIZING DISEASES OF FEMALES

(Due to Tumor code No. 8041)

In the adult the virilizing or masculinizing disease is usually caused by a tumor arising in the adrenal ovary or from cell rests of one of the above tissues. It is characterized by excessive hirsutism (especially of male type), amenorrhea, enlargement of clitoris, deepening of voice, excessive musculature, and excessive 17 ketosteroid excretion. Surgical removal of the tumor is the treatment of choice.

Another form of the disease begins in childhood. It is due to overproduction of androgen type hormones from bilaterally hyperfunctioning adrenal cortices. In many of these patients there may be associated manifestations of hypoadrenocorticism (i.e., excessive salt and water loss and failure to maintain a fasting blood sugar). Treatment with corticoids has proved valuable in reducing the activity of the glands (preferably through suppression of endogenous ACTH) and in supplying exogenously administered corticoids. In adults the drugs of choice appear to be prednisone or prednisolone in doses of 5-25 mg daily orally in divided doses. Some investigators feel that the same dose of cortisone acetate by the I M route may be more efficacious in this syndrome.

Most cases of excessive hirsutism in females are not due to endocrine disease but to hereditary or racial factors and should not and cannot be treated by any internal medications or surgery.

HYPOGONADISM

Hypogonadism is due to a failure of the sex glands to elaborate sufficient quantities of their hormones to bring about or maintain the appearance of secondary sexual characteristics.

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make these individuals into normal adult males in every way except that they cannot produce sperm. These patients must be placed on testosterone and maintained for life on adequate doses of testosterone. There is little evidence that any pituitary substance or gonadotropin is of significant value in treating these patients (see pp. 412-413).

1. Long acting testosterone preparations 200-500 mg IM every 2-4 weeks may be employed (see page 420).
2. Free testosterone pellet implantation is experienced hand is an excellent method. The dosage is as follows 300 mg with minimal but an effective dose. Average is about 600 mg. For maximum effect about 900 mg are implanted. The pellets are implanted subcutaneously with a trocar or into a pocket made by blunt dissection. Either the infra scapular area or anterior thigh area is used. Testosterone pellets remain and are effective for 3-4 months and then must be replaced.
3. An alternative method is the oral or sublingual administration of the drug to the patient and entails all the difficulties of prolonged oral administration. Dosage varies with various individuals but 10-25 mg daily orally is usually adequate dosage to cause maturation and virilization and maintenance of this state. Evidence now indicates that there is no advantage of buccal over oral administration.

- B. Postpubertal Oral use of methyltestosterone is probably the method of choice. The dosage necessary to control symptoms and to aid in overcoming the protein loss and debility of age is often as low as 5-20 mg daily. This dose may be used for a short period of time to control symptoms or may be continued indefinitely for control of symptoms and for its protein anabolic effect. The long acting testosterone by injection may also be employed.

FEMALE HYPOGONADISM

The most common symptom of female hypogonadism is amenorrhea. However most cases of late amenorrhea are not due to hypogonadism.

AMENORRHEA (code No. 61)

Etiology

Normal menstruation depends on many factors. From the functional point of view there must be an intact pituitary gonadotrophic axis. Any breakdown in the cycle of production of the pituitary or ovarian hormones coincident with normal menstruation or the lack of an endometrium capable of response to ovarian hormones will result in amenorrhea. Treatment is based on the measure on the level at which the disturbed physiology exists.

- a If pati nt has regular period she probably is manufac turing suffi e t estrog and does not n ed th rapy
- b If cycl are very irregula and the patient suff rs f om m nopausal symptoms t ogens given in cy li al fa hion may be helpful Begin estrogens about 5 d ys after onset of last menstrual period and continue in a cy lic fa hion Ethinyl Estradiol U S P 0 05 mg o Di thylstilbestrol U S P Stilboe t 1 B P 0 5 mg by mouth daily exc pt for the fi st 5 day of e ch month This is imple for patients to rem mber
- c If patient has b com am no h l there is no rvas n to give troge in do la ge enough to reinstitute menses b t only to cont l symptom
- d Duration f therapy Thi ha not been standard d and m st b adjust d to the individual ca Thr months to 1 y r usually suff ces
Maint na dos for lif Be as of the anaboli ffect of estrog a d b use of th r known beneficial eff t on cal ium m tabolism trogen th rapy ha b n recom m nded f r the d rati n of lif fo women beyond th menop use The advisab lity of this p ti e r mains un s tled

If a pati nt i on long term t og n therapy sh should ke pan ac t record of th dosag badul a d bl dung Wh never bleeding occ ss that is not on sch dule (d ring w thdrawal pha) an inv tigation f tumor should be in tit ted V ginal cytologi al examina tion should b rri d o t routin ly v ry 6 m ths or 1 y

- 2 If y hologi l spe t M y of the ymptom of th meno paus are undo bt dly p y hologi al Th most ommon symptom i nxi ty more s v emotional disorde s may occu

a S dation Ph oberb tal U S P Ph nobarb tone B P 10 mg (1/4 gr) t i d q i d

- b If y hoth rapy Simpl xplanation and re s ran e that th liv n d n t b hanged be a s of th menopause a ad quat in m st patient In th m e ev re cas s however th x d of p y hiatrist m y prove sary

B S gi l nd X ray M opa Thi s s diffe from the nat ral m po only in th b uptness and verity of the ympt m both phy i l gi al and p ych i gi al In these p ti nt it i advisab l t help th pati nt liv as n rmal a life as po bl If th pati nt an be mad to hav normal periods and if th y und tand that th m trual y l will go on un ha ged th y usually mak tabl adjustments Estrogen th rapy i a f natural menopause (above)

Compl tions of Postm nopaus l Hypogonadi m nd Tr tment

A Ost poro (P 378)

B Se il V gnat If v Di thyl tilbe t ol U S P Stilboe trol

B P 0 1 0 5 mg o oth tr gen (a p g 422) daily

ally Stilbe t ol vaginal upposito i co taini g 1 mg may

be used daily f 10 t 14 days while contini g oral tilbestrol

not (see p 413) Employ estrogen alone or in combination with progesteron (see p 422)

- (2) With high urinary gonadotropins Gonadotropins are likewise of no value treat as above

3 General measures

- A Adequate diet and dietary treatment as needed to correct abnormal deviation of weight
- b Psychotherapy in cases of emotional disturbances
- c Correction of anemia (see p 219)
- d Correction of any other metabolic abnormality (e.g. hypothyroidism)

MENOPAUSE

Etiology

Failure of the ovaries with cessation of menstruation may result from several causes most commonly the natural menopause and menopause due to surgical removal or x ray Failure may be secondary to malfunction of other glands usually pituitary or thyroid

- A Menopausal Syndrome (code No 805)
- B Artificial Menopause Due to Roentgen Rays (code No 788 471)
- C Hypofunction of Ovary Due to Unknown Cause (code No 788 x10)

Diagnosis

The menopause is due to a loss of ovarian function and is manifested by vasomotor disturbances (e.g. hot flashes) nervousness emotional instability and amenorrhea Abnormal uterine bleeding may occur in the natural menopause before amenorrhea sets in

Treatment

- A Natural Menopause The menopause in the female is characterized by at least 2 important factors physiological failure of ovarian function which occurs rather rapidly in the female and psychological recognition of the fact that a productive life is at an end Many believe it is a result of this there is a marked change of life an implication that in addition to cessation of reproductive function there is complete alteration in one's way of life sexual activities personal life relationships etc This latter belief is entirely erroneous Most women go through the menopause with out any difficulty in fact without symptoms However in those having symptoms one must carefully evaluate the role of the physiological and psychological factors before beginning any therapy Most cases will have a mixture of physiological and psychological factors

- 1 Physiological aspects (estrogen therapy) The characteristic symptoms that seem undoubtedly to be due to the cessation of ovarian function the most prominent being vasomotor instability (e.g. flushing) Another may be the feeling of tension especially in the head In women who suffer primarily from symptoms of cessation of ovarian function use of estrogens is indicated The dosage and method of administration used depends on whether or not the patient is still menstruating

MENORRHAGIA (code No 785 x20) FUNCTIONAL UTERINE BLEEDING

With the gradual failure of ovarian function excessive bleeding at the time of the menses is common. This is due to prolonged hypoestrogenic effect without concomitant progesterone production.

Another type of functional uterine bleeding which occurs most commonly in young women is due to a hyperestrogenic effect. In any case of prolonged and unusual bleeding suspect and rule out neoplasms of the uterus.

Treatment consists of administration of progesterone 100 mg orally or 10 to 15 mg IM daily for 5 days or 125 to 250 mg Hydroxyprogesterone Caproate N N B (Delalutin®) IM once. This converts the proliferative endometrium into a secretory one with complete shedding when the progesterone is withdrawn.

OBESITY (code No 007)

(Due to Excess Food code No 010 70x)

(Undetermined Cause code No 010 70y)

Obesity may be defined as an increase in weight of over 10% above normal due to general deposition of fat in the body.

Normal weight is difficult to determine for average clinical practice however normal as defined by the standard age height and weight tables is satisfactory (see table below).

From a metabolic point of view all obesity has a common cause intake of more calories than are required for energy metabolism. The reasons for differences in the energy utilization of various individuals whereby that on person can utilize his calories more efficiently than another is unknown. Although most cases of obesity are due to simple overeating a few endocrine disorders lead to specific types of obesity (e.g. Cushing's syndrome and hypothalamic lesions) but these conditions are rare. Hypothyroidism on the other hand is not necessarily associated with obesity.

Treatment

Specific weight reducing chemical agents and hormones singly or in combination are either ineffective or hazardous and have no place in the treatment of exogenous obesity.

A Diet (see p 58) is the most important factor in the management of obesity. There are a number of points to consider:

1. Calories. In order to lose weight it is necessary to decrease the intake to below the caloric requirement of the individual (see p 47). One can determine a very approximate average weight loss per day with a given diet by the following formula:

$$\frac{\text{Approximate Caloric Requirement Per Day} - \text{Number of Calories in Diet}}{4000} = \text{Weight Loss in lbs./Day}$$

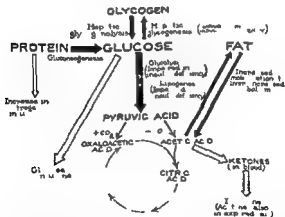
The number of calories per day to prescribe for a patient varies with age or up to a certain temperament and the urgency of the need for weight reduction. A daily caloric intake of 800 to 1200 Calories is satisfactory. ing diet

the administration of insulin. Although failure of the islet cells of the pancreas to manufacture sufficient insulin to supply the endogenous demands of the body is an important factor, this is not the only factor in clinical diabetes. The best evidence for this is the small insulin requirement of totally depancreatized humans as compared with the insulin requirements of patients with spontaneously occurring diabetes.

Physiology

The primary metabolic defect in diabetes appears to be an inability to metabolize glucose properly. However, this defect has a marked secondary influence on protein and fat metabolism. The complicated disturbed metabolism can best be shown by oversimplified diagrams. The sketch on p. 392 shows the normal interrelationship. The presumed defect in diabetes is indicated.

However, in diabetes, since insulin is diminished or absent, other metabolic pathways, all of them catabolic, take precedence. The following diagram shows the relationship in diabetes.



Abnormal Glucose Metabolism in Uncomplicated Diabetes (Report of the Committee on the Nomenclature of the American Diabetes Association, 1957, Lang Medical Publication, Los Angeles, California)

From the above diagram it can be seen that as the result of impaired glucose oxidation the following major metabolic alterations have occurred:
1. Glucose is lost into the urine, diminishing the body's store of carbohydrate.

weight for fat tissues have a definite but slow metabolism. It has been shown that obese people with low B M R's can tolerate 0.2 Gm (3 gr) or more of thyroid per day without change in B M R. Prolonged administration of thyroid may suppress the patient's normal thyroid secretion.

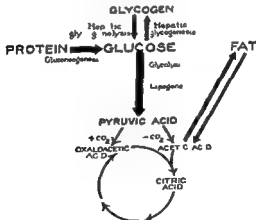
B. Dinitrophenol must never be given to any patient. It is a toxic drug that may cause blindness or even death.

C. Exercise Although exercise increases the energy output, extreme exercise is necessary to significantly alter weight. Playing 18 holes of golf, for instance, raises the total caloric requirements only by about 100-150 Calories. In addition, exercise tends to increase the appetite and may make it more difficult to control the diet properly.

D. Psychological Factors Overeating is largely a matter of habit and in some cases may be associated with deep underlying neurosis. Whatever the cause, the patients must be retrained in their eating habits and educated to understand that once their weight is normal, they can easily become obese again by eating more than their normal caloric needs.

DIABETES MELLITUS (code No. 871.785)

Diabetes mellitus in man is a metabolic disorder of unknown etiology, the metabolic defect of which appears to be corrected by



Normal Interrelationship in Glucose Metabolism

II

Insulin is utilized clinically to enhance carbohydrate oxidation. This is measured clinically by noting the lowering of the blood sugar or the disappearance of glycosuria.

A Duration of Action of Insulin Preparation There are 3 main types of insulin available

1 Short acting insulin Insulin Injection U.S.P. B.P.

Regulin Insulin

b Crystalline zinc insulin

(For clinical purposes the actions of these 2 insulins are identical. Crystalline zinc insulin is used only because of its greater purity). These are useful mainly in controlling postprandial blood sugar elevations.

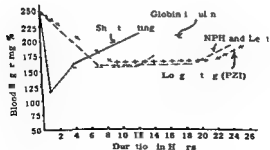
2 Long acting insulin Protamine Zinc Insulin Injection U.S.P. B.P. This is useful in lowering the mild or hypoglycemia which is present during the main part of the time between meals.

3 Intermediate acting insulin

Isophan Insulin Injection U.S.P. (NPH) A stable mixture with protamine which is 21 minutes and has been added to the PZI in the management of most diabetic patients. It may also be tailored to fit the patient by addition of appropriate amounts of regular insulin.

b Lente Insulin N.N.D. Made by a mixture of crystalline and protamine preparations (protamine and phosphate free). Action is almost identical with that of NPH insulin. Globulin with Zinc U.S.P. This insulin is similar in action to 24-hour insulin but is that is due to the effect of a prolonged release of insulin in many diabetic patients. It is sometimes mixed with short acting insulin.

d Intermediate insulin See page 396



Extent and Duration of Action of Various Insulins
(in a Fasting Diabetic)

- 2 Liver glycogen stores become depleted in supplying glucose to the body
- 3 Protein stores begin to break down at an excessive rate to supply glucose (gluconeogenesis)
- 4 Fat mobilization to the liver and catabolism is increased
- 5 The excess acetate formed cannot be immediately utilized and condenses to give rise to ketone bodies (β -hydroxy butyric acid and acetoacetic acid)
- 6 As a result of increased ketone body formation and the slow utilization ketone bodies accumulate in the blood and spill over into the urine. Since these substances are acids they are excreted in the urine joined to fixed base (Na^+ , K^+ , Ca^{++} , etc.). The accumulation of acid ions and loss of fixed base results in the condition known as acidosis.

Diagnosis

The typical clinical features in untreated diabetes mellitus are polydipsia, polyphagia, polyuria, and weight loss, but these occur only in the more severe forms of the disease. Because of the varied and nonspecific symptomatology of the disease, the actual diagnosis of diabetes rests upon laboratory evidence. It should be emphasized that all laboratory tests for diabetes are non-specific and abnormalities of one or all may occur in other diseases (e.g., hyperthyroidism, liver disease). However, the presence of other diseases, glycosuria and hyperglycemia are diagnostic!

- A Glycosuria. The presence of reducing substances identified as glucose in the urine is excellent presumptive evidence.
- B Hyperglycemia. The finding of an elevated fasting blood sugar and/or abnormally high blood sugar level 2 hours after a meal containing 100 grams of carbohydrate or a dose of 100 grams of glucose is almost diagnostic in the absence of other diseases. This test should be performed, however, only after the patient has been on a high carbohydrate diet for at least 48 hours. It is well known that the previous diet influences carbohydrate tolerance. A high fat diet will decrease tolerance (give diabetic type curve even in normals) and a high carbohydrate diet will increase tolerance.
- C Interpretation of Blood Sugar Tests. A normal fasting blood sugar does not rule out diabetes. If the 2-hour postprandial blood sugar level is over 150, one can be reasonably certain that the condition exists. If the blood sugar level is between 90 and 140, it is necessary to perform a glucose tolerance test to establish the diagnosis.

TREATMENT OF DIABETES MELLITUS

In order to treat patients with diabetes it is necessary that one thoroughly familiarize himself with the following:

- 1 Insulin (probably of greatest importance)
- 2 Diet
- 3 Influence of exercise
- 4 Prompt treatment of complications
- 5 Newer agents effective against diabetes mellitus. Tolbutamide (Orinase®)

- 2 **Syring** In order to aid patients syringes are available calibrated in units (U) rather than cubic centimeters. Many of these syringes have 2 calibrations (U20 U40 or U40 U80) and it is important to have the patient thoroughly understand which scale he is using. It is advisable however to multiply a syringe having one calibration only. Special syringes are available for blind diabetic patients.
- 3 **Sites of injection** Insulin is usually administered subcutaneously. The site of injection is generally the anterior thigh but insulin may also be given in the lateral thigh in the arms or at the waist or abdomen or in unusual circumstances subcutaneously in a other part of the body. It is important that the site be constantly changed so that the same site is not injected more often than once every 2-3 weeks. Crystalline and regular insulin may be administered I.V. to patients who have been taking insulin with ut allergic reactions. *Do not give PZI NPH or lente insulin intravenously.*

Do this or that

The nutritional needs of the diabetic patient are not significantly different from those of normal individual. The principal question to be settled is the quantity and type of body to be allowed in the diet. (For detailed food habits in making up diet see pp 48-50 and for examples of diabetic diet see p 57.)

Nutrition Whenver possible diabetic diets should be made up in terms of how much as much as possible than weight for ideally the extent of weight gain or loss by weighing e.g. daily unnecessary.

The following factors must be taken into consideration in estimating the diet:

- A **Caloric Needs** (See p 47) The caloric needs of the diabetic are similar to those of non-diabetic individual and the same variables must be considered. In general one should remember that the diabetic patient should be kept normal or slightly below normal weight level and never permitted to become obese.
- B **Protein** Protein must be adequate and high protein diet are desirable because the available glucose (50%) from protein is relatively low for utilization than ingested carbohydrate. At least 1 Gm. of protein per Kg (0.45 Gm./lb.) of body weight should be given although 1.2-2 Gm./Kg (0.5-0.9 Gm./lb.) is preferable.
- C **Carbohydrate** Carbohydrate should not be given in a restricted form. Protein should be given to 57 and 10% of total daily vegetable intake longer to digest and do not absorb and less available blood glucose will be obtained. The quantity of carbohydrate must be determined in the diet till unsatisfactory in general the view is taken that in the diabetic the aim is to keep the individual close to physiological normal as possible and to keep his carbohydrate at approximately normal level. In order to administer insulin if necessary to control a year or so hypoglycemia and glycosuria in general the 2-3 Gm. of carbohydrate per Kg (0.9-1.4 Gm./lb.) of body weight is recommended with the site of the time if patient is ill. Increase with the time gradually in carbohydrate to 4 Gm. per Kg (1.8 Gm./lb.) of body weight. This is a general rule and in a mild diabetic it

B. Intermediate insulin Intermediate insulin may be prepared by mixing a short acting or intermediate (commercial) and a long acting insulin (add last) in one syringe. This gives a balance between the immediate and the prolonged effects by modifying the mixture one can tailor the insulin requirements to individual needs. The mixtures usually employed are 2:1 and 3:1 (crystalline zinc PZI) or 2:1 and 3:1 (NPH PZI).

1. Points to remember in use of insulin mixtures

a. Regular insulin must always be withdrawn into syringe before PZI (because of protamine excess in PZI)

b. Same unitage of regular insulin and PZI must be used

c. General effect of I/PZI mixtures is largely PZI effect (little point to this mixture) + 1 intermediate daytime lighttime effect 3:1 greater daytime effect

2. Application of tailored insulin mixtures

a. If glycosuria occurs in all fractional urines increase total insulin mixture

b. If glycosuria occurs in fractional urines 1 and 2 only (daytime glycosuria) increase regular insulin mixture

c. If glycosuria occurs in fractional urines 3 and 4 only (nighttime glycosuria) increase PZI in mixture

C. Commercial insulin preparations come in various strengths (units/cc) in 5 and 10 cc ampules identified as follows

Potency Preparation	Color of Rubber Stopper	Color of Label
U20 Unmodified regular	Yellow	Yellow
U20 Crystalline	Yellow	Gray and blue or blue gray and yellow
U20 PZI	Not available	
U40 Unmodified regular	Red	Red
U40 Crystalline	Red	Red and gray
U40 PZI	Red	White label with red printing
U40 NPH	Red	Blue and white
U40 Globin zinc	Red	Red and brown
U40 Lente	Red	Gray label with red and black printing
U80 Unmodified regular	Green	Green
U80 Crystalline	Green	Green and gray
U80 PZI	Green	White label with green printing
U80 NPH	Green	Blue and white
U80 Globin zinc	Green	Green and brown
U80 Lente	Green	Gray label with green and black printing
U100 Unmodified regular	Orange	Orange

D. Administration of Insulin

1. Selection of insulin preparation In view of the large number of insulin preparations available there is often much confusion regarding dosage. The effective it is necessary to place the patient on one type of insulin and have him become familiar with this type. One use and a limitation of subcutaneous that the volume per injection is kept to 0.25 to 0.5 cc. About 80% of patients are able to use U40 insulin.

- B Compl ting Fa to s** A larg number of factors adv ly
all ct the c rs f th patient with diabetes. All of th on
dt s perate by altering the abs rption of glucos by int
fer g with ca bohydr t oxidation by ausing excess v
rb hyd t formation. The most imp t nt of these facto
a t infections espec lly those of pyog m nature w th fev
s d to emu. Any infectio s erio s in a d ab tic fo it
ompl tely ups t th quahbrum established by th apy l
w ya l crea es the n d for i s lio nd is one of th mo t
e common pre ipitating cau of k tosi d a d o is. The
fo e ny nd all inf t ons in th diabetic s to b av ided
wh ne e pos ble wh n th y o ur th y m st b t ted
promptly a d v go o ly. Du ing sev re infect o s it ge er
ally advi bl to di ont n PZI and to b gun th py in divid d
do es 3 8 tim s daily with regula o crystall n in l n as
n ed dt cove m tp dial glycos i
- C G ral F t** P t is with diabetes should liv n ly
rual hygi nic lives a p sible. Th y b l d b as red of
d quate st ho l d b abl to t t home if at all po sible
and sho ld ngag in no pation q i g a le at mod rat
e is but m st av id st n ou o cupations of gr t tim
p t n th y should hav good g n al kn wledge of
diab tes

STEPS IN THE MANAGEMENT OF THE DIABETIC PATIENT

Th r e ma y d q at m thod f m n gu g di beti Th
followi g i plan u ed by th tho whu h f llt b pre t al
d phys l g lly so d

*STEP A - DIAGNOSTIC WORK-UP

- 1 C mplet hi tory nd phy l xaminat fo diagno i and
to l t th p f y o m t n g o m pl t n g
d ea
- 2 U naly fo qual t uve s ga n m n d g f t n g u n
p m n a d sp m il t d 2 3 h aft a h
m l M ga p t b k f a t and dia t
a id
- 3 Bl od s ga xamin t Fast ga d 2 ho m tp dal
l vels d t m n d o if s ay a g l tol an e
t t p f m d in ld lypatue is in th p e of
nal di it advi bl t p f m a g l u c t l and
test with m l t in ga t det mane th appro
m t n l th e h ld If th i l v y high (v 160 180
mg %) i may b n e s s a y to e blood s ga l v l e a
b k d qua y f th rapy rather than th glyc ria

*TL 8 CALCULATION LED ARRAULEMENT OF DIET (e p 57 f xampl of d ab t d t)

- 1 D t m n th lo ic ds f th p t t. Thus i th
m f th m n d u betu (p 47)
- 2 Cal ul t th p t in CHO and fat t t of th d t as
outli d on pp 46 ff

may be advisable to keep the carbohydrate level down to a minimum and the use of insulin. However, both for physiological and for psychological reasons, the carbohydrate level should in no case be below 100 Gm. per day.

D. Fat. After the carbohydrate and protein amounts have been determined, fat is given to make up the remaining caloric requirements.

E. Vitamins. Patients with diabetes tend to develop vitamin deficiencies, especially of the B complex. The reasons are not always clear. It may be due to inadequate food intake, restricted diets, or increased requirements. Improper utilization of vitamins. Deficiencies on adequate diets are rare, if they occur, treat as needed (see p. 59).

F. Frequency of Feeding. Diabetics should be given small frequent feedings rather than large meals. By frequent feedings the use of high protein intake and less concentrated carbohydrate food, one can maintain a lower and more even blood sugar level with less glycosuria. An excellent plan is to divide the feedings into six meals, three regular meals and three small feedings (e.g., milk) at mid morning, mid afternoon, and bed time.

Tolbutamide (NND (O.S.))

An encouraging recent development in the treatment of diabetes mellitus is the introduction of the oral hypoglycemic (Oral sulfonylurea) effective against certain forms of the disease. Tolbutamide is a mild and relatively short-acting hypoglycemic. It appears that its mode of action is to stimulate the production of insulin by the beta cells of a pancreas which would otherwise be deficient in the hormone (islet of Langerhans). It does not potentiate the action of insulin. A diagnosis of nonvalvular diabetes mellitus is essential for its use. Therefore, tolbutamide is of no use (and should not be tried) in every diabetic (e.g., in the case of the diabetic patients who tend to develop ketosis). Its only advantage is that it is in the older patients with a mild degree of diabetes which cannot be controlled by diet alone (i.e., in the mild adult nonketotic type).

Dosage. Tolbutamide is applied in a total of 0.5 Gm. G. and a total dose of 3 Gm. daily, divided into three doses, and decreases rapidly to the minimal effective dose. The average maintenance dose is 0.5 to 1.5 Gm. daily.

Toxic reaction. A skin rash, dermatitis, and other allergic disturbances occur only occasionally. They have been reported in instances of granulocytopenia following use of the drug but this may occur and should be borne in mind.

Other Factors Influencing Diabetes

A. Exercise. Exercise enhances the oxidation of sugar. It diminishes the need for insulin. Therefore, exercise in the maintenance of diabetes is beneficial. However, patients taking sulfonylurea should be cautioned against strenuous exercise without first notifying their physician. It is not uncommon to have a hypoglycemic reaction after a set of tennis. When a patient is taking a sulfonylurea, the physician should appoximate the same amount of exercise as will be required by his normal active life. This is true also of the split-dose treatment of diabetes.

time of glycosuria on the preceding day determines the re-adjustment to be made. The glycosuria at a y t m must be plotted at a minimum of 1 c o g r a t h n g e e n r e d t i o n (or +) with the zymatic test paper method. In any specimen being analysed especially with theoger acting ulins change should not be made frequently simply because semikard insulin concentration is not usually occurring.

a If all specimens give green no adjustment of dosage or composition of insulin is necessary.

b If glycosuria (greater than green red 2+) occurs after breakfast after the noon meal the regular insulin is increased.

If glycosuria (greater than green red 2+) occurs in the afternoon after the evening meal reduce the evening dose of insulin in the proportion in which the insulin is increased.

d If glycosuria (greater than green red 2+) occurs in all specimens both regular and proportion in insulin is increased.

Amount of insulin required will vary with each patient. Generally a very rough guide for the use of insulin is as follows:

(1) Yellow red 1+ (or ++): Add 5 to 10 units.

(2) Orange red 2+ (or +++): Add 10 to 15 units.

(3) Black red 3+ (or ++++): Add 15 to 20 units.

f If the euglycaemia (specimen remains blank) the patient holds blood sugar level of hypoglycaemia and hemorrhoids should be examined. Adjustment of dosage must be made as needed with the following:

4 Readjustment of the dosage of insulin. If variation of the insulin dosage and composition does not maintain the glycosuria at a minimum for a given period of the dietary intake for the preceding meal should be decreased and the intake for the following meal increased.

W L P D - FOLLOW-UP OF PATIENT

After patient has been adequately treated should hold blood sugar at regular intervals ranging from 100 to 150 mg per 100 ml in the postprandial state.

1 Hypoglycaemia. Carefully question patient as to occurrence of any hypoglycaemic attacks. If they occur low insulin dosage during times of day they take place.

2 Examine patient's urine. If all urine is entirely free of sugar the patient is controlled (if renal threshold is normal). Absence of hypoglycaemic reactions shows that if all urine is blank in therapy of patient told new will improve and therapy. There is no indication to having more frequent tests. (On the contrary the risk is increased that moderate glycosuria is not harmful if the metabolism of the body are being fulfilled. However it is usually best to keep adequate control over patient's glycosuria to ignore the risk is entirely.) If there is marked glycosuria in a year the insulin is adjusted accordingly.

3 Weight patient. Full weight patient is right to be sure that the weight is increasing and remaining stationary as desired. But little the data accordingly.

3 Divide the diet into the following

- a Three medium sized meals. It is advisable to space the meals as far apart as possible (i.e. an early breakfast and a late dinner). This will spread the absorption of glucose over a longer period of the day.
- b Three small feedings to be taken between meals and at bedtime. Milk and low CHO fruits are preferred for this.

STEP C - DETERMINING THE INSULIN REQUIREMENTS

- 1 Determination of amount of glycosuria. Have patient eat his diabetic diet for 1 day preferably without change in activity. For the next 24 hours he is to collect and label fractional urines as follows (Patient voids just before breakfast and discards this specimen).
 - a Urine No. 1 All urine voided from breakfast to just before lunch. This is pooled and a few drops taken for qualitative sugar. The remainder is saved.
 - b Urine No. 2 All urine from lunch to just before dinner. Pool and save as above.
 - c Urine No. 3 All urine from dinner to just before retiring. Pool and save as above.
 - d Urine No. 4 All urine from retiring to just before breakfast. Pool and save as above.

The few drops of each individual urine fraction are analysed qualitatively for sugar and the remainder pooled for the daily total quantitative sugar.

- 2 Calculation of approximate insulin requirements from quantitative urine sugar determinations. Since roughly 1 unit of insulin will cover 2 Gm. of glucose, the insulin needs in the uncomplicated diabetic can be calculated as follows:

$$\frac{\text{Gm. of Glucose in 24 hour}}{\frac{\text{Urine Specimen}}{2}} = \text{Approximate No. of Units of Insulin Needed per 24 Hours}$$

The insulin (24 hour requirement) is generally given as NPH or as a mixture in a single dose $1\frac{1}{2}$ hour before breakfast. The usual mixtures are 2:1 or 3:1 (crystalline zinc PZI) or NPH regular mixture.

- a In severe or complicated diabetes because the patient needs insulin immediately these measures cannot be performed (see p. 403).
- b High renal threshold. In certain elderly patients or those with renal disease who have a high renal threshold for sugar this method will be without value. These patients must be controlled by the determination of the blood sugar levels while fasting and 1 hour after meals. They should begin with small doses of long acting insulin (3-10 units/day) and increase as indicated by tests.

- 3 Adjustment of insulin dosage and mixture. The patient continues to collect his urine fractions as outlined above and the dosage and composition of the insulin mixture is determined each morning after completing the qualitative sugar analysis for the previous day. Quantitative sugars are usually not necessary after the first day. The amount and

- 2 Epinephrine (adrenaline) If patient is well nourished generally if using short acting insulin dilution is not depleted of glycogen epinephrine 0.5 I.U. (8.15 mg) of 1:1000 solution because it may cause retention of sodium so that food may be taken by mouth.
- 3 Metformin If patient is unconscious and IV glucose is not available (and if phenylephrine is either not available or ineffective or successful) glucose by rectum may be given. Add 2 Tbsp of syrup or honey to a pint of warm water and give slowly by rectum.

C Prevention of Relapse When patient is taking pyriminazine 1 mg 4 times a day one thing should be carefully watched for danger of relapse. High protein foods such as milk should be given in addition to carbohydrate.

OTHER COMPLICATIONS OF INSULIN THERAPY

Allergic Reaction

Fortunately all complications are very rare and most are localized. These individuals are generally sensitive to pork pancreas from which about 60% of commercial insulin is made (the other 40% from beef). These patients should be given penicillin preparation (Special Insulin) which is put in 10 c ampules of U40. If patient is allergic to the insulin the manufacturer should be told (p. 112).

Lipodystrophy

This is a complication consisting of atrophy of subcutaneous fat at the site of injection. This may be caused by improper rotation of injection sites but even so occurs in spite of a careful therapy. These patients should use U50 or U100 insulin at the injection sites and make injections at body sites which do not thicken.

COMPLICATIONS OF DIABETES

CHRONIC COMPLICATIONS

There is a tendency for processes that tend to occur with increasing frequency in diabetic patients than in nondiabetics and a few of these are rather typically associated with diabetes. They are mentioned here only to call attention to them. The therapy is generally that of the acute condition but for the prevention of the disease and delaying of the disease. The most common are:

- A **Acidosis** Especially if the peripheral circulation is poor. For therapy see p. 208.
- B **Diabetic Polyneuropathy** (See p. 358)
- C **Diabetic Ocular Complications** Includes cataracts which are treated surgically and retinopathy which may form if therapy is not adequate.

- 4 Draw blood for fasting blood sugar level to determine whether fasting hyperglycemia is being adequately controlled (This need not be done on every visit in fact it can be done quite infrequently once the patient is standardized)

COMPLICATIONS OF INSULIN THERAPY

HYPOGLYCEMIA (code No 574)

Hypoglycemia is the most common complication of insulin therapy and usually occurs when the diabetic fails to eat or engages in too strenuous exercise. It is manifested by weakness, hunger, irritability, faintness, and tremors and convulsions, all of which are relieved promptly by the administration of glucose. If a diabetic patient is seen unconscious and if diagnosis of coma or insulin reaction is impossible or in doubt, give 50% glucose I/V. This will usually overcome the insulin reaction and will not generally harm the patient in diabetic acidosis.

Prophylaxis

- A Glucose Because of the danger of insulin reaction, the diabetic patient should carry several lumps of sugar or glucose lozenges at all times. If he feels the onset of a reaction, he should take some sugar.
- B Identification Card Every diabetic should carry a card with the following information:

I AM A DIABETIC AND TAKE INSULIN

If I am behaving peculiarly, give me sugar or hard candy or orange juice slowly. If I am unconscious, call an ambulance immediately, take me to a physician or a hospital, and notify my physician. I am not intoxicated.

My Name is _____

Address _____ Telephone _____

Physician's Name _____

Physician's Address _____ Telephone _____

Treatment

- A Mild Hypoglycemia If patient is conscious and able to swallow, sugar, glucose, or orange juice may be given.
- B Moderate to Severe Hypoglycemia Do not attempt to feed patient if unconscious. If patient is unconscious, one of the following methods may be used:
- 1 I/V glucose (treatment of choice) 20-50 cc (5-12 g) of 50% glucose I/V slowly. As soon as consciousness is restored, oral feeding may begin.

Diagnosis

Diabetes is manifested by headache, instability of vision, hyperventilation and fever. Nausea, vomiting, diarrhea and abdominal pain may also be present. The sweetish 'fruity' acetone breath may be detected. On physical examination the skin and mucous membranes are usually dry, blood pressure is low, eyeballs soft and pulse usually rapid and thready.

Principles of Therapy

For management of the following

The principle of therapy with the diabetic patient is to promote recovery in coma as well as possible. It is imperative that a patient in a coma be hospitalized and treated as a medical emergency. Each case must be individually treated.

A Insulin is given in amounts in order to bring about a return to normal metabolism. Use of short-acting insulin never treat patients in coma with P.I. NPH or lente insulin. The initial dose of insulin should be 100-200 units on the hip. It should be given I.V. and the other half subcutaneously. Insulin may also be added to I.V. fluids being administered. Because of the mode of action of insulin (see p. 393) there is no need to repeat intravenous glucose 30-75 units every 2 hours as needed until the ketonuria begins to disappear. If hypokalemia is present in the patient being given I.V. because of the uremic blood, sorbitol and potassium of metabolic alkalosis is administered.

B Glucose. In diabetic coma on a strict ketogenic diet and a dose does not the hypoglycemia and glycosuria. Although the patient with diabetes may have a high blood sugar level, the total available carbohydrate is extremely low. The former state is not a very satisfactory one. An adequate glucose supply upon which the patient is overcoming acidosis is the patient should be given glucose when the blood sugar level has begun to fall rapidly. It has been shown that ketosis can be reversed by giving very large amounts of glucose to diabetic patients who are deprived of insulin. The concentration of normal metabolic pathways are re-established through the so-called fat oxidation cycle. Severe ketonemia is overcome. In addition, it is possible to precipitate hypoglycemic coma in a patient with low glucose levels before the ketosis has been brought under control.

C Fruity breath is garlicky. It has been shown that after I.V. infusion of glucose disappears from the blood stream of diabetics as rapidly as it does from normal individuals. It has been suggested therefore that this sugar be substituted for glucose in the treatment of diabetic coma. It is attached in the body of insulin. However, there is no evidence to show that in spite of its utilization in the diabetic it has no antiketogenic effect with this substance. Until this conclusion is reached, it should not be used as glucose and inulin in the management of diabetic coma.

D Fluid and Electrolyte

1. Fluids must be given to replace those lost by diuresis and vomiting. The serum is usually best given I.V.
2. Adequate sodium chloride is very important. This replaces fixed bases in the extracellular fluid and so helps in overcoming the acidosis. As a result of ketosis the loss of

- Renal Complication Inter-capillary glomerulosclerosis characterized by hypertension albuminuria and edema. Treat as for glomerulonephritis (see p 293)

ACUTE COMPLICATIONS OF DIABETES

When the amount of insulin in the body is inadequate for metabolic needs abnormal metabolism results with ketone body formation and finally with acidosis. Infection which can be an increased demand for insulin usually precipitates ketosis. There is an early or mild phase and a late or severe one.

- A Diabetic Ketosis Without Acidosis CO_2 content or combining power is normal or slightly depressed (above 50-60 Vol % or 27 mEq)
- B Diabetic Acidosis Reduction of CO_2 content or combining power (below 50 Vol % or 27 mEq). The patient may be conscious, pre-comatose or comatose.

DIABETIC KETOSIS (Without Acidosis) (code No 543)

In this disorder ketone bodies are found in the urine and their presence establishes the diagnosis. Examine the patient for infection or other precipitating factor. The fluid and electrolyte balances are undisturbed.

Treatment

Patient should be hospitalized for regulation if ketosis is severe.

- A Treat any infection which may aggravate the disorder immediately.
- B Diet A range diet to contain 3 equal feedings with interval feedings between each meal and in the evening.
- C Insulin
- 1 If ketosis is very severe use only short-acting insulin. Give insulin to cover each meal as necessary until the urine is free from ketone bodies. Then begin reducing insulin dosage slowly as tolerance to carbohydrate improves.
 - 2 If ketosis is not severe start and regulate as in complicated diabetes.
- Follow up When ketonuria has been reduced patient is managed as for uncomplicated diabetes according to the severity of his disease (see p 399).

DIABETIC ACIDOSIS (Diabetic Coma) (code No 542)

When ketone formation is proceeding at a rapid rate the fluid and electrolyte balance and pH of the body is upset (see below). The ketone bodies are organic acids which replace the HCO_3^- in the body and also are excreted from the body combined with fixed bases. The loss of fixed base and the disturbance of the buffering systems leads to acidosis. The increase in the glucose in the blood produces osmotic effects on the body fluids.

insulin per gram of sugar (5-10 units insulin per liter) and 20 mEq potassium and possibly phosphate. The urine should contain sugar at all times to avoid hypoglycemic reactions.

- b As soon as reports come from laboratory if CO_2 combining power is below 11 mEq/liter (10 Vol %), calculate amount of sodium lactate or sodium bicarbonate desired (see p. 15) and administer immediately. (To administer sodium bicarbonate I.V. mix 1 cc olive chemically pure sodium bicarbonate in 100-300 cc cool distilled water and administer. Do not heat or sterilize the solution.)
- c Gastric lavage may be performed with introduction of 300 cc of physiological saline or 5% NaHCO_3 .
- d As long as patient is unconscious administer 5% glucose in saline or other salt solution as indicated (about 60 drops per minute). See p. 405.
- e As soon as patient is conscious and able to swallow give fruit juice (200 cc orange juice with 1 tablespoon honey syrup or glucose) every 3-4 hours until ketonuria has stopped. Stop I.V. glucose and fluids.

B Follow up

- 1 Patient under observation. After 4 to 8 hours of administration of I.V. fluids watch patient carefully for potassium deficiency (i.e., weakness, respiratory distress) and check the ECG (see p. 14). Give oral potassium only if potassium administration is not able to be given. Discontinue potassium as soon as the convulsions have begun. If the patient is still not settled. When patient is able to swallow give complementary potassium salts by mouth as this is the safest route.
- 2 Oral feedings and fluid. If ketonuria is disappearing or is rapidly improving (usually in 24-48 hours) and the patient is conscious the following may be given:
 - a Small frequent feedings of liquid and semi-liquid foods containing 50-75 Gm glucose and protein (as milk) every 3-4 hours day and night and cover with 5-33 units regular insulin every 4 hours.
 - b Food fluids by mouth. Examine urine for sugar and ketone bodies every 3-4 hrs.
 - c Regular diet. After 24-48 hours if patient shows steady improvement place on regular diabetic diet and begin regulation as outlined on p. 392.

DIABETES ASSOCIATED WITH OTHER CONDITIONS

PREGNANCY

The management of the pregnant diabetic is little different from that of a young diabetic.

- A During the early period of pregnancy the treatment is a lowering of the normal threshold and considerable lability of the blood sugar level.

sodium chloride from the body may be as great as 30 Gm (50% of average total body sodium) in 48 hours. In the mild case sodium chloride needs to be replaced and sodium chloride solution with glucose is usually adequate fluid therapy.

- 3 Replacement of bicarbonate buffer. As the ketone bodies are excreted or oxidized CO_2 is formed which replaces the disappearing ketones and the CO_2 combining power returns to normal. However in patients with severe uncomplicated metabolic acidosis it may be advisable to administer more rapidly available HCO_3^- and fixed base (Na^+). This may be given I/V as sodium bicarbonate or M/6 sodium lactate.
- 4 Potassium replacement. As sodium is administered (as sodium chloride, sodium bicarbonate or sodium lactate) and glucose is metabolized and stored the potassium which has entered the extracellular fluid migrates rapidly intracellularly or is washed out with the fluid through the kidneys. When this occurs there may be a temporary and dangerous extracellular potassium deficiency with weakness, respiratory distress and at times cardiac arrest. Solutions containing potassium must be given to correct this and generally when I/V glucose becomes indicated potassium may be added to the infusion mixture (see p. 21). It must be used with extreme caution in the absence of adequate urinary output. The level may roughly be checked with the Ecg (p. 14).

Treatment.

A Emergency Measures. The following is an outline of the steps that may be employed in the average patient in diabetic coma; however each case must be individualized and therapy modified as necessary according to the needs of the patient.

- 1 Hospitalize patient. Keep patient warm, avoid excessive warmth. Avoid the use of barbiturates and narcotics.
- 2 If in SHOCK treat with I/V plasma and other shock measures especially vasopressors (see p. 27).
- 3 Blood chemistry. Draw blood for CO_2 combining power and blood sugar also for sodium, potassium and chloride if these tests can be performed.
- 4 Give insulin at once.
 - a Through same needle as for drawing blood give 30-100 units of regular or crystalline insulin I/V immediately as well as a like amount subcutaneously.
 - b Repeat insulin giving 50-75 units subcut every 1-2 hours until there is rapid diminution in blood or urinary sugar.
- 5 Catheterize patient. An indwelling catheter may be left in place allow this to drain continuously. Examine spot (per cent) urine specimen very hourly for ketone bodies and sugar.
- 6 Fluids, electrolytes and glucose.
 - a Begin I/V infusion of saline. May also begin lysis of saline M/6 sodium lactate or other fluid solutions at same time (see p. 15). As soon as urinary sugar has changed to dilute or negative the hanging I/V fluids to 5% glucose in saline to which $\frac{1}{2}$ unit of

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HYPERINSULINISM

(Adenoma code No 871 8044A)

(Without Tumor code No 871 784)

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- II During the latter three months there is often a marked decrease in glucose tolerance necessitating increased insulin dosage. This is not universal however and many go through pregnancy without significant changes in tolerance.
- III Before the onset of labor and delivery it is advisable to change to short acting insulins to avoid possible reaction from lack of food.
- IV In view of work suggesting sex hormonal imbalances in pregnant diabetics therapy with estrogens or progestone or both has been advocated as being of value in diminishing fetal mortality. However carefully controlled studies using modern diabetic treatment methods show as good or better results without resorting to this expensive and troublesome procedure.
- V Since many diabetic pregnancies go beyond expected term or the infants are unusually large it has been suggested by many that pregnancy be terminated at about 36 weeks. The preferred method appears to be cesarean section.

The Care of the Infant

Treat all infants of diabetic mothers as prematures. Keep infant in incubator under oxygen for first several days. Observe the newly born infant carefully for the first 72 hours for hypoglycemic reactions that may occur supposedly as a result of islet cell hyperplasia. This is more apt to occur in the newborn of poorly controlled diabetics.

SURGERY

Surgery in the diabetic at present presents little hazard over that of the surgical procedure per se. However there are certain problems peculiar to the diabetic and these problems naturally vary with the severity of the disease and the urgency of surgery.

Emergency Surgery

- A. F. Non Traumatic Conditions Usually diabetics requiring emergency surgery for non-traumatic disorders are in ketosis with or without acidosis and require immediate treatment of their diabetes. These patients should be treated as patients with acidosis or coma (the latter if a general anesthetic is to be used). The general program should be as follows:
- 1 Draw blood for CO₂ combining power and blood sugar also for electrolytes panel (sodium potassium chloride) if possible.
 - 2 Begin 5% glucose in saline infusion I.V. slowly (not over 70 drops per minute) and continue infusion throughout surgical procedure. One unit of insulin per 2 Gm glucose may be added to the infusion (25 units for each 1000 cc of 5% glucose).
 - 3 Give 50 units short acting insulin I.V. if ketosis is present.
 - 4 After returning from surgery continue therapy as in diabetic coma (see p 404) until oral feeding can begin and diabetes and hyperglycemia are controlled.

Chapter 16

HORMONES AND HORMONE LIKE AGENTS

PITUITARY AND PITUITARY LIKE HORMONES

The pituitary consists of two parts

- A Posterior part which is part of the CNS
- B Anterior portion which is devoid of direct innervation
Contains pituitary like hormones that influence the gonads & are labile & destroyed by the pituitary degrading enzyme

ANTERIOR PITUITARY HORMONES

All of the anterior pituitary hormones are protein substances and must therefore be administered parenterally & effectively taken by mouth. They are digested by the digestive enzymes. In addition with the exception of the growth & lactogenic hormone which has a direct effect on the growth of the gonads & the anterior pituitary hormones appear to have a regulatory function on the other glands of the endocrine system.

In the last few years several of these hormones have been prepared in pure form. These include the growth & lactogenic hormone (ACTH) lactogenic thyroid stimulating (TSH) follicle stimulating (FSH) and interstitial cell stimulating (interstitial) hormones. There may be others in the anterior pituitary but they have not yet been fully identified. Of the preparations only ACTH and thyrotrophin are at present commercially available.

Corticotropin (ACTH)

Corticotropin has been shown to have remarkable effects in relieving many diseases & processes which are not satisfactorily influenced by other therapeutic agents. Its effects are entirely mediated by the stimulation of the adrenal cortex. Corticotropin is a protein of molecular weight 4500 and contains 191 amino acid residues. It has been found to be similar and structurally related to the hormone insulin.

A Major Effect of ACTH ACTH in a dose of 100 units in a normal human being produces the following metabolic effects:

- 1 Increase in the rate of excretion of sodium and potassium and phosphate
- 2 Retention of sodium and reduction of water
- 3 Elevation of fasting blood sugar and diabetic glucose tolerance test
- 4 Increase in the rate of excretion of uric acid

410 Hyperinsulinism

an empty stomach long after meals and are relieved promptly by the administration of glucose. Hypoglycemia noted during episodes usually is below 40 mg %. A glucose tolerance curve drops to exceedingly low levels often only after 5-6 hours. Ischaemic hypoglycemia of hepatic, nervous or other endocrine gland origin must be considered in establishing the diagnosis.

Treatment

A Emergency Treatment As for hypoglycemic reaction from insulin overdosage (see p. 402)

B General Measures

1. Corticotropin (ACTH) or the cortisones. The administration of these drugs (for their hyperglycemic effect) has been shown to be of considerable benefit in the management of some children suffering from this condition. Some children without adenomata have been successfully maintained or treated intermittently with these drugs.

2. Diet. High protein, high caloric, high fat, low carbohydrate.

a. The diet is low in carbohydrates in order to avoid stimulation of the pancreas as to elaborate insulin. Rapidly utilized carbohydrates are replaced by slow acting ones (e.g. 5-10% vegetables and fruits and bananas and apples). Protein is an important source of slowly liberating carbohydrate which apparently has less stimulating effect on the pancreas and is useful to supply added calories.

b. Small feedings. The diet is best divided into six or more meals a day. It may be necessary to feed the patient at regular intervals throughout the entire 24 hours. If the hypoglycemia is severe as this it is advisable not to prolong medical therapy but to prepare the patient properly for surgery.

3. Sedation. Phenobarbital, phenobarbital, 15-30 mg (1/2 gr) q.d. may be valuable in reducing nervous irritability.

4. Restriction of physical activity. Exercise increases utilization of glucose thereby magnifying the effect of excess insulin. If exercise is unavoidable, sedation should be preceded by supplementary carbohydrates.

5. Identification. Patient should carry a bracelet or card similar to that used by a diabetic (see p. 402).

6. Emergency CHO. Patient should be required to carry a small supply of rapidly available carbohydrate (candy lumps of sugar) at all times. He should avoid taking these except when definitely indicated.

C Surgery. Complete excision of hyperplastic adenomata is indicated when this is found to be the cause.

Chapter 16

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Certain pituitary like hormones that influence the gonads are labored by the placental endocrine gland

ANTERIOR PITUITARY HORMONES

All of the anterior pituitary hormones are protein substances and must therefore be administered parenterally to be effective. If taken by mouth they are digested by the digestive enzymes. In general with the exception of the growth and lactogenic hormones which effects are not mediated directly through other glands the anterior pituitary hormones appear to have a regulatory function on the glands of the endocrine system.

In the last few years value of these hormones has been pronounced in pediatric medicine. The ethionine b-npr paraderm pur or lms is a growth promoting agent. The growth and orotropin (ACTH) is a growth promoting agent. The thyroid stimulating (TSH) follicle stimulating (FSH) and interstitial cell-stimulating (Luteinizing) hormones. The may be either for anterior pituitary but they are cytotoxic and if of the peripheral endocrine system ACTH and thyrotropin are important components of the avian system.

Corticotropin (ACTH)

Corticotropin has been shown to have remarkable effects in regulating the endocrine system which is not at all directly influenced by other endocrine glands. It effects the adrenal medulla by the stimulation of the adrenal cortex. Corticotropin is a protein of molecular weight 4500 and is derived from the hypothalamus and is a polypeptide hormone. It effects the hypothalamus itself.

- A Main Effects of ACTH in adult human beings
- 1 Increase in secretion of adrenal cortex and pheochromocytoma
 - 2 Increase in sodium and secondary retention of water
 - 3 Elevation of blood sugar and cholesterol in blood and urine
 - 4 Increase in excretion of uric acid

- Increased urinary 17 ketosteroids and cortiosteroids
- Fall in circulating eosinophils and lymphocytes and leucocytosis of polymorphonuclear leucocytes
- For clinical effects, uses and dosages see page 423

Pituitary Growth Hormone (PGH)

Purified PGH has been employed in normal humans, pituitary dwarfs and panhypopituitary individuals. In no case has there been any evidence of growth as measured either by metabolic effect or actual physical growth. The older crude growth hormone preparations have likewise been of no benefit under controlled experimental conditions.

Lactogenic Hormone

Has not been employed in human research. Its presence is necessary for the initiation and apparently for the continuation of lactation in breasts which have been prepared for lactation by estrogens and progestins during pregnancy.

Follicle-Stimulating Hormone (FSH)

FSH has different actions in male and female. In the female FSH stimulates the development of ovarian follicles. In the male it stimulates the germinal epithelium of the testes to produce spermatozoa. It apparently has no effect on the Leydig cells; hence does not influence testosterone secretion. Pure FSH has not been used clinically but in cases of hypogonadotropic eunuchoidism a purified preparation has been employed after initial stimulation of Leydig cells with chorionic gonadotropin to initiate spermatogenesis (see page 386). At present no good FSH preparation is commercially available.

Interstitial Cell-Stimulating Hormone (ICSH) (Luteinizing Hormone)

A. In the female ICSH apparently has a dual action:

1. Stimulates growth of theca cells
2. Transforms the mature follicles into corpora lutea

B. In the male it stimulates the Leydig cells of the testes with resultant testosterone secretion.

There is no good commercial pituitary ICSH. Clinically ICSH is substituted for by use of chorionic gonadotropins which have a similar action (see page 413).

Thyroid-Stimulating Hormone (TSH)

TSH is exceedingly effective in stimulating the thyroid gland. It has limited clinical usefulness at present. Its principal uses are to differentiate pituitary hypothyroidism from primary hypothyroidism. It has also been used in an attempt to stimulate metastatic thyroid cancer to take up radiiodine for therapeutic purposes.

Recently it has been advocated for the treatment of thyroiditis but its place in the management of this disease is still open to question.

Dosages: 5-10 U.S.P. units I.M. every 12 or 24 hours for 2 days. Repeat ^{131}I uptake or protein-bound iodine. If uptake or PBI is increased, primary hypothyroidism is not present.

Other Hormones

The pituitary probably exerts also at least other hormones (e.g., luteotrophic) but their exact physiological roles are not yet known.

POSTERIOR PITUITARY HORMONES

The posterior pituitary hormones are polypeptides composed of 8 amino acids. Their exact chemical structure has been determined and they have recently been synthesized. Like the anterior pituitary hormones they are effective only when administered parenterally (g.i.e. I.M.). They exert their action

- 1 They raise blood pressure (pressor action) (an anesthetized animal)
- 2 Cause fluid retention without osmotically equivalent osmolar retention (antidiuretic action)
- 3 Cause uterine contractions (oxytocic action)

To date there has not been a preparation of the antidiuretic from the posterior principle. They may be identical. The oxytocic factor may likewise have some pressor effect.

Clinical Use

- A Antidiuretic Pressor principle also used primarily for the treatment of diabetes insipidus also to prevent and relieve abdominal distention (F. D. bet. Insipidum pag 366)
- B Oxytocic is employed but little when indications for the induction of uterine contraction exist

Preparations Available

Name	Action	How Supplied	Average Dosage
Vasopressin Tannate NND (Pitresin Tannate)	Antidiuretic pressor	Olysatone 5 units/c	0.3-1 I.M. (5-16 μ) q 1-2 hr
Vasopressin Injection USP		Aqueous solution 20 units/cc	0.25-0.5 cc (4-8 μ) q 3-4 h a.i.m.
Oxytocin Injection USP (Pitocin)	Oxytocic	Solution 10 units/cc	0.3-1 cc I.M. (6-16 μ) as indicated

PITUITARY LIKE HORMONES ELABORATED BY PLACENTA

The most important of the pituitary like hormones is that elaborated by the placenta during pregnancy. The hormone is effective to maintain gonadotropin its physiological action is almost identical with that of ICSH hormone. It has been shown that this hormone specifically functions only if an intact anterior pituitary gland is present. It is of no value in inducing spermatogenesis or ovulation or maintaining corpus luteum by itself. Many of its alleged effects have been due to the presence of FSH whose action the presence of chorionic gonadotropin may potentiate.

Clinical Indications

In the Male

- 1 Cryptorchidism In a few selected cases chorionic gonadotropin may induce descent of testis
- 2 Hypogonadism Chorionic gonadotropin is useful in some

414 Thyroid Hormone

types of hypogonadism although testosterone medication is generally preferred

- II In the Female Chorionic gonadotropin may aid in inducing ovulation and maintaining corpus luteum in a few selected cases of sterility if adequate FSH is present

Preparations Available

- A Chorionic Gonadotropin (HCG) derived from the urine of pregnant women is available commercially under a wide variety of trade names. It is marketed in ampules of 100, 500, 1000 and 3000 IU per cc.
- II Equine gonadotropins derived from the serum of pregnant mares is also available commercially. This is a mixture of FSH and LH. It is not generally recommended because of its marked sensitizing effect and induction of antihormones by protracted use. Only short courses should be employed.

Average Dosage

Usual doses range from 200-1000 units every day or every other day.

THYROID HORMONE

The active principle of the thyroid gland appears to be the iodine containing amino acid thyroxine. Thyroxine probably never occurs in the free state in the organism but is contained in a protein molecule thyroglobulin. Another iodine containing amino acid diiodotyrosine with weaker physiological effects is also found in the gland. Triiodothyronine (3,5,3',5'-tetraiodo-L-tyrosine, Cytomel®) has been isolated from the thyroid. Its exact physiological role is unknown. The action of the thyroid hormone is that of a general cellular metabolic stimulant with resultant increase in oxygen consumption (increased metabolic rate). Its exact mode of action is unknown.

Method of Administration

Thyroid hormone either in the form of thyroglobulin (desiccated thyroid), thyroxine or triiodothyronine is effective when taken orally. There is a marked difference in the rate of metabolic response between triiodothyronine and thyroxine. In the case of thyroxine little effect is noted after a single dose for about 24 hours and the maximal effect is not reached for 8-10 days. After the medication is stopped there is a slow loss of the effect depending on the initial BMR and the level reached during thyroid medication. In general it may be stated that at least 4-6 weeks must elapse after thyroid medication has been discontinued before one can be reasonably certain that the effect has been dissipated. In the case of triiodothyronine the peak effect is reached in 12-24 hours and the effect is over in about 9-14 days.

Contraindications

Thyroid hormone is indicated only in thyroid deficiency states. Its use as a general metabolic stimulant is not indicated and is worthless. It has been shown that patients with thyroid deficiency rarely

require over 0.15 Gm (2 gr) of Thyroid USP daily. Patients with uterine fibroids can easily tolerate 0.3 to 0.5 Gm (5 to 7½ gr) monthly without any effect on BMR, although the 131I uptake is suppressed. A good general rule is that if a patient requires over 3 gr of Thyroid USP daily his need for thyroid medication should be questioned.

Preparations Available

- A Thyroid USP BP (desiccated thyroid). This is the preparation of choice. The evidence indicates that any of the commercial preparations on the market containing more or less iodine than the official dose are as or less toxic. To avoid confusion in dosage always use the official thyroid.
- Dosage: 0.045 to 0.2 Gm (1/2 gr) daily.
- B Thyroid USP (desiccated thyroid). This is also available in the form of a 300 mg capsule. The thyroid and the small capsules dosage may be different.
- C Sodium L-thyroxine NND (Tirothyronine Cytom 100). Meripal is a desiccated preparation of the thyroid gland. It is a long-acting thyroid extract metabolized with the following properties: 1. It is a hypothyroidism. A general dosage of 0.05 to 0.15 mg daily.

PARATHYROID HORMONE

Parathyroid hormone is a protein substance derived from the parathyroid gland. It can be employed clinically for the treatment of hypoparathyroidism (for the treatment of hypoparathyroidism and hypocalcemia).

Parathyroid hormone has major effects on calcium metabolism and on the bone metabolism. It is a potent stimulant of the osteoclasts and the osteoblasts. It is a potent stimulant of the osteoclasts and the osteoblasts.

It is a potent stimulant of the osteoclasts and the osteoblasts. It is a potent stimulant of the osteoclasts and the osteoblasts. It is a potent stimulant of the osteoclasts and the osteoblasts.

Classification

Parathyroid hormone is classified only in a type of hypoparathyroidism (for the identification of parathyroid gland).

Preparations Available

- A Parathyroid hormone USP. Aqueous solution contains 1 unit per 100 units per cc.
- A Parathyroid hormone USP. 50 to 100 units (0.5 to 1.0) 2 to 5 times daily.

- I M as indicated
- E** Hydrocortisone acetate N N D (Hytakerol®) Each cc contains 125 mg of dihydrocortisone acetate in oily solution
 Dosage See page 378
- C** Calciferol U S P B P (Vitamin D₂) 15 mg (150 I.U.)
 daily (has a potency of 40,000 units per mg) (see page 378)

THE ADRENAL HORMONES

ADRENAL CORTEX

The hormones of the adrenal cortex are all steroidal substances. To date over 30 different steroids have been isolated and identified from animal adrenal glands or adrenal venous blood. The vast majority of these steroids have no demonstrable metabolic effect.

Questions have been raised as to whether or not all the steroids isolated from the adrenal cortex are truly naturally occurring or whether they are artifacts produced in the chemical laboratory. Recent isolation of hormone from blood obtained by catheterization of renal veins shows that most of the hormone (about 90%) is 11-hydroxycorticosterone (Compound F) and about 10% corticosterone (Compound B). In general it may be stated that the best demonstration of the effects of adrenal cortical hormone is the demonstration that seen following administration of ACTH (see page 423). Recently aldosterone has been isolated from adrenal. This hormone appears to have only sodium and water retention and potassium losing effects. It is about 20 times as potent as desoxy corticosterone (D O C A). Hormones with estrogenic and androgenic effects have also been isolated.

Clinical Preparation

Of the dozen steroids isolated, these have had significant clinical use and trial. In addition to these two important chemical derivatives have been prepared.

A Desoxycorticosterone Acetate U S P Deoxycortone Acetate B P (D O C A) It is only a significant metabolic effect sodium and water retention and a decreased urinary potassium excretion. In this aspect it is approximately twenty times as potent as cortisone. It has no effect on carbohydrate or protein metabolism.

B Cortisone Acetate, U S P, B P

1. The principal metabolic effect of this is
 - a Retention of some sodium and water
 - b Increased excretion of nitrogenous potassium and phosphorus
 - c Increased blood sugar and ability to maintain blood sugar levels during fasting in Addisonian patients
 - d Return of EEG pattern to normal in Addisonian patients
 - e One of the most important effects is the adrenal cortical atrophy which results with prolonged administration probably due to excessive ACTH inhibition. This may result in the absence of the normal response of the pituitary to the axis to stress.

2. For clinical effect a dose of

- C Hyd cortisone USP** This compound has recently been made available for oral use. It is chemically similar to those of cortisone. It is probably about 1 1/2 times as potent as cortisone on a weight basis. The metabolic effects of hydrocortisone appear to be identical with those of cortisone.
- D Hydrocortisone of Cortisone and Hydrocortisone**
 Very highly effective in the treatment of the most important of these is the B. A. or derm. of hydrocortisone. Fludocortisone is a late N. N. D. This drug is a potent spot test for hydrocortisone. It is chiefly of value in the treatment of profound effusions and is retentive about 5 times as long as that of DOCA and is limited useful as a possible Addison disease or typically for the treatment of the adrenal cortex.
- E Prednisone N. N. D. Prednisolone N. N. D. and Methylprednisolone (M. D. L.)**
 Prednisone and prednisolone are the hydrocortisone derivatives of cortisone and hydrocortisone respectively. They appear to be little if any different from each other. They differ from the parent compound in that they (1) are little if any diuretic (2) are probably less potent in and (3) are about 3.5 times more potent in their therapeutic effects. For these reasons they are generally replacing their parent compounds where the hormone is used for other than plasma replacement (e.g., edema, effusions). Methylprednisolone is about 1 1/2 times more potent than prednisone and prednisolone. It is potent in the treatment of the adrenal cortex.
- F Whole Cortisol (F. T. T. A. W. T.)** of biological activity of the adrenal gland. Although it is identical (if any) and mode of action probably identical with the parent compound of 1 in the margin, many of the derivatives are recently an attempt has been made to convert to a derivative of cortisone in an oily solution. This is a potent lipid soluble derivative also effective but it is the lower bioactive form (F. T. T. T.) and it is the fact that it may contain some of the active steroid corticosteroid substances that hold not place on the text of the L. P. trial and it has been shown that mainly compound F (about 2 mg/c) with less compound E.
- P. M. T. A. V. L. B. I.**
 A. D. Y. T. T. E. A. C. T. T. USP D. Y. C. O. R. T. I. S. O. N. E. A. T. T. B. P. (D. O. C. A.) or De. Y. T. O. S. T. R. I. M. U. T. I. T. U. D. O. L. Y. F. O. R. P. P. I. M. T. A. R. Y. M. T. A. N. O. F. A. D. D. I. S. I. B. I. T. B. I. E. T. S. 2 mg tablets for a. R. P. T. N. F. O. M. M. U. S. M. E. M. B. E. D. O. C. A. I. I. F. F. E. T. I. V. E. W. H. N. E. W. F. L. O. W. E. D. D. S. G. 1/2 2 tablets daily dissolved in the water by the gut. It is limited to the following treatment as when injected.
 2 Sol. T. I. N. M. S. M. H. 5 mg (1/12 gr) p.
 D. S. G. 1 3 mg (1/80 1/20 gr) I. M. d. i. l. y. f. m. a. i. n. t. n. a. n. e.
 3 H. I. T. A. U. S. P. 75 mg (1 1/4 gr) o. 125 mg (gr) each for subcutaneous implantation.
 D. O. G. O. 75 mg pellet if each mg of DOCA is required by injection up to 3 mg (1/20 gr) p. d. y. H. E.

- 1 M. S. I. d. c. ted
- B D. h. d. r. o. t. a. c. h. s. t. e. r. o. i. d. s. (H. t. k. e. r. o. l. [®]) Each cc. contains 1 25 mg. of d. h. d. r. o. t. a. c. h. s. t. e. r. o. i. d. s. in a. n. y. s. o. l. u. t. i. o. n.
Dosage See page 378
- C Cal. i. f. e. r. o. l. i. S. P. B. P. (Vitamin D₂) 1 5 mg. (1 63 1/2 gr.) daily (has a pot. cy of 40 U. U. unit per mg.) (see pag. 38)

THE ADRENAL HORMONES

ADRENAL CORTEX

The hormones of the adrenal cortex are all steroidal substances. To date over 100 different steroids have been isolated and studied from animal adrenal glands or adrenal venous blood. The vast majority of these steroids have no demonstrable metabolic effect.

Questions have been raised as to whether or not all the steroids isolated from the adrenal cortex are truly naturally occurring or whether they are artefacts produced in the chemical laboratory. Recent isolation of hormones from blood obtained by catheterization of renal veins shows that most of the hormone (about 90%) is 11-hydroxycorticosterone (Compound F) and about 10% is cortisone (Compound B). In general it may be stated that the best demonstration of the effects of adrenal cortical hormone is hormones that are of following corticotropin (ACTH) administration (see pag. 422). Recently aldosterone has been isolated from adrenals. This hormone appears to be only sodium and water retaining and potassium losing effect. It is about 20 times as potent as desoxycorticosterone (D. O. C. A.). Hormones with estrogenic and androgenic effects have also been isolated.

Clinical Preparations

Of the adrenal steroids isolated, there have been two significant clinical uses and two. In addition to these two important chemical derivatives have been prepared.

- A De. o. x. y. c. o. r. t. i. c. o. s. t. e. r. o. n. A. e. t. a. t. e. I. S. P. B. P. (D. O. C. A.) Its only significant metabolic effect is on sodium and water retention and increased urinary potassium excretion. In this respect it is approximately twenty times as potent as cortisone. It has no effect on carbohydrate or protein metabolism.
- B C. o. r. t. i. s. o. n. e. A. c. t. i. v. e. U. S. P. B. P.
- The physiological effect of cortisone are:
 - Retention of sodium and water
 - Increased retention of strontium, potassium and phosphorus
 - Increased blood sugar and ability to maintain blood sugar level during fasting in Addisonian patients
 - Return of EEG pattern to normal in Addisonian patients
 - One of the most important effects is the adrenal cortical atrophy which results with prolonged use. This is probably due to endogenous ACTH inhibition and may result in the absence of the normal response of the pituitary gland to stress.
2. Mercuric effect and use see

4 Rare uses in cardiology e.g. Stokes Adma syndrome and cardiac arrest

5 Diagnostic test of hepatic glycogen storage

B Preparation & Availability

1 Epinephrine Injection U.S.P. Adrenaline B.P. 1 mg / cc (1:1000) Administered subcutaneously may be given I.M. and even I.V. if diluted in 1 liter of solution. Dose 0.2-1 cc (3-15 µ) as indicated

2 Epinephrine Inhalation U.S.P. 10 mg / cc (1:100) For inhalation only

3 Epinephrine in Oil Injection U.S.P. 2 mg / cc (1:500) Administered only I.M. Usual dose 0.2-1 cc (3-15 µ)

Actions of (Norepinephrine)

A Clinical Uses Adrenaline is used almost exclusively for its vasoconstrictor effect. Used in acute hypotensive states (surgical and non surgical shock) central vasomotor depression and hemorrhage (see p. 27)

B Preparation & Availability Levorotary Bitartrate U.S.P. (Levophed[®]) 0.2% solution containing 1 mg free base per cc (1:500) in ampoules containing 4 cc

C Mode of Administration Add 4-16 cc or 0.2-0.5 mg/ml to 1000 cc of 5% dextrose solution for I.V. use through a drip chamber. Determine response to initial dose of 0.25-0.5 cc of diluted solution per 10 Kg body weight and then maintain flow as rate to maintain blood pressure (usually 0.5-1 µ/min). Adrenaline is a very potent agent and great care must be employed in its use. Do not allow solution to infiltrate or slough may result

MALE SEX HORMONE

A number of natural hormones have been isolated from the testes and the most important androgen has been testosterone. It is biologically active and is the male sex hormone. Testosterone is responsible for the development of secondary sex characteristics in the male (facial hair development, enlargement of penis, prostate and seminal vesicles). Administration of testosterone to the female causes development of male secondary characteristics in the female through androgenic effect. It can be partially overcome by the simultaneous administration of estrogen.

Of greater importance than its androgenic effect is its prostatic effect (the building effect). Testosterone has mild androgenic and water-retaining effect.

Testosterone

Testosterone is not active on prostatic or other effect when swallowed. At present the only way to administer the agent effectively is to place it under the skin by injection or a pellet. A test on preparation which does not occur naturally in the testis (MT) is effective when swallowed. Methyltestosterone, a human androgen, causes atrophy and has apparently produced jaundice after prolonged administration other ways to increase metabolism and androgenic effect are similar to those of testosterone.

quirements by injection exceed 3 mg ($\frac{1}{20}$ gr) one additional pellet should be implanted [e.g. for a requirement of 5 mg ($\frac{1}{12}$ gr) per day by injection implant 6 pellets]
Duration of action 6-8 months

4 Deoxycorticosterone trimethylacetate 25-75 mg i.m. once a month

D Adrenal Corticosteroids (N.N.D.) May be administered i.m. subcut. or i.v. Used in treatment of Addisonian crisis
Dosage 20-100 cc (5-20 dr) or more daily as indicated

E Lipoid Adrenal Cortex Steril Solution (C.A.) Administered i.m. only

Dosage 5 cc ($1\frac{1}{4}$ dr) i.m. daily during crisis (in addition to aqueous adrenal cortical extract 1-2 cc (16-32 dr) daily for maintenance

D Cortisone (Compound E) See page 424

E Methylcortisone (Compound F) See page 424

F Fludrocortisone See page 425

G Preductal and Pred Solone See page 425

ADRENAL MEDULLA

Until recently it has been thought that the adrenal medulla secretes a single hormone epinephrine. However it has been shown that the tracts of adrenal medulla of cattle (*U.S.P. Reference Standard*) contain two closely related hormones i.e. epinephrine (about 80%) and nor epinephrine (about 20%). The two have different actions as outlined below

Substance	Blood Vessels	Cardiac Output	Blood Pressure	Blood Sugar (Glycogenolysis)
Epinephrine	Vasodilation (over all)	Increased	Elevated?	Elevated
Nor epinephrine (levarterenol)	Vasoconstriction (overall)	No effect	Elevated	Elevated 1/2 that of epinephrine

Vasodilator of coronary arteries

Since epinephrine may be synthesized or derived from natural sources (usually the latter) and hence contains natural with nor epinephrine the reason for some of the apparent paradoxical physiological effects of the peptide preparation becomes clearer.

In addition to the above epinephrine causes immediate elevation of blood sugar by inducing glycogenolysis in liver and muscle.

Epinephrine

A Clinical Uses Epinephrine is used in a great many clinical conditions including the following:

- 1 Allergic conditions Bronchial asthma urticaria angioneurotic edema and others
Control of superficial bleeding especially from mucous membranes
- 2 Used with local anesthetics to slow down absorption

C. Chl f P p rail In view of the great number of reports on the value of it may be difficult to decide which to use. The physician should choose those preparations which are most economical to the patient and still effective. The use of testosterone by repeated injection should be reserved only for those very few conditions where the patient should not be sedated while the patient is in the hospital. The dose must be very exact (1 mg daily). Even in the cases in which the patient is not sedated, the patient is off of testosterone may be given to the patient orally. It may be indicated in the administration of I.M. medication. The reference to the use of choice becomes methyltestosterone or its implantation. The latter is one of the long-acting testosterone preparations.

FEMALE SEX HORMONES

The female sex hormone is a steroid with marked physiological effects on the endocrine system (endocrine) and the reproductive system.

Etiology

A. Effect of Estrogen in the Human The physiological effects of estrogen are:

1. Proliferation of the endometrium.
2. Changes in vaginal epithelium (hyperplasia and lowering of vaginal pH below 4.0).
3. Decrease in proliferation of the breast.
4. Stimulation of osteoblastic activity.
5. Slight potentiation of anabolic effect.
6. Modest reduction in water retention effect.

B. Clinical Use Estrogen is used for both (for their effect on the endocrine system and the treatment of osteoporosis).

1. Female Estrogen is used as replacement therapy in the case of (anovulatory) (gonadotropin).
2. Male Use as adjunct in the therapy of carcinoma of the prostate.

E. Separation Available There are many substances that have estrogenic activity including natural substances (e.g., diethylstilbestrol, diethylstilbestrol, diethylstilbestrol). However, of all these, only a few of them are used clinically. There is no evidence that any of the estrogens are more toxic than any other. Toxicity (in the case of vomiting) is usually due to overdosage. Most of the estrogens are extremely powerful drugs having profound physiological effects in very small doses and also having the potential to cause side effects that are quite insidious. The physician should select 0.2 g daily preparation and limit the therapeutic rather than hang on to a woman. There is little evidence as to the administration of the estrogen by any other than the oral absorption route to be very complete and there is no evidence that the oral vomiting can be decreased by progestational administration. There is likewise no evidence that the naturally occurring estrogen is any more efficacious than the synthetic ones. Although estrogen is physiologically active in mammary tumors of animals, there is no evidence that they are carcinogenic in humans.

and testosterone propionate. Testosterone and testosterone propionate when injected (or swallowed) are partially (about 30-50%) excreted as 17-ketosteroids in the urine. Methyltestosterone is not excreted as 17-ketosteroid. In fact its administration will result in diminished urinary 17-ketosteroids due to diminished endogenous testosterone production.

A Clinical Uses In either sex testosterone may be indicated in any debilitating disease for its protein anabolic function. In addition there are certain uses specific to the different sexes.

1 Male As replacement therapy in failure of endogenous testosterone secretion (e.g. hypogonadism, male climacteric). Its use in impotence, angina pectoris, bronchial asthma and benign prostatic hypertrophy without benefit.

2 Female

a Gynecological conditions. Functionally bleeding, endometriosis, dysmenorrhea and premenstrual tension.

b Disease of the breast. Advanced carcinoma, chronic cystic mastitis, suppression of lactation.

B Preparations

1 Testosterone USP (Free)

a **Philex USP** 75 mg implanted subcut. Dosage 4-8 pellets every 3-4 months.

b **Mixtione** suspension in aqueous solution for IM use. The dosage has not yet been determined but appears similar to testosterone propionate in oil.

Oil contains 5 mg/Gm for local testosterone effect. Average 0.5-1 Gm locally rubbed in once or 3 times daily.

2 Testosterone Propionate USP BP 1 oil for IM injection 5-10-25 and 50 mg/. Dosage varies from 10-100 mg daily depending on clinical treatment.

3 Testosterone Cytopropanate NND (Depot testosterone) 1 oil for IM injection 50 and 100 mg/cc. This preparation has a duration of action of 2 to 5 times or more than testosterone propionate. Dosage 100-200 mg weekly to 500 mg monthly as indicated.

4 Testosterone Enanthate NND (Delateal) 1 oil 100 mg/cc. The duration of action of this preparation is comparable to that of Depot testosterone. The average dose is 200-400 mg every 3-4 weeks.

b **Methyltestosterone USP BP** Do not use methyltestosterone in treatment of thyrotoxicosis, acromegaly and pigmentation or liver disease. Dosage 5-10 mg daily.

a **Tablets** 5-10-25 mg for oral.

b **Tablets** 5-10 mg for sublingual or buccal administration. There is no advantage of buccal over oral use. Oral 5 mg/Gm.

6 Fluormethosterone NND (Halotest) This drug is 10-100 times as potent as methyltestosterone. It is about 2-3 times as potent as the parent drug. Its toxicity is less than that of methyltestosterone is not yet known. It is applied in 2 and 5 mg tablets. Dosage 1-2-10 mg daily orally.

7 Nandrolone (Nilex) is a steroid hormone with allegedly less corresponding androgenic effect than other testosterone preparations. It is applied in 10 mg tablets. Average 30-50 mg daily orally.

C Preparation Available See table below

Preparation	Method of Administration	Dose
Pargitron USP BP	IM	5-10 mg daily
Injectable Pargitron USP BP	Pellet form plantion Oral tablets*	100-300 mg (for habitual throat ed- ema)
Hydrocortisone Cortisone NND (Diluted)	IM 125 mg/c	125-150 mg every 2 weeks
Ethidone USP BP	Oral tablet	60-100 mg daily
Notethidone (Notethidone)	Oral 5 mg tablet	20-50 mg daily (sw- allow time to po- tential ethidone)
The islet of Langerhans secretes insulin and glucagon. The pancreas secretes insulin and glucagon. The pancreas secretes insulin and glucagon.		

CLINICAL USE OF CORTICOTROPIN (ACTH) AND THE CORTISONES

In the past few years both pituitary and corticotropin (ACTH) acting by adrenal stimulation and the corticosteroids administered orally (corticosteroids) have been shown to have profound modifying effects on many diseases. These effects are the result of the action of the hormones on the metabolism and immunological activity of the compounds (see page 411). These agents do not appear to cure. Their clinical appearance to be modification of the clinical picture, permissibility so that toxins no longer can affect the cell. When the drug is discontinued the disease may rapidly relapse. No other hormones or combinations of agents that have been shown to have the effect of these substances. The diseases in which ACTH and the corticosteroids have been tried in sufficient numbers to warrant the evaluation are outlined on page 424. In general it can be said that these agents are interchangeable in the treatment of a patient found to be responsive to one of these hormones and not to the other.

Dosage

Dosage varies considerably in the individual. In general it is advisable to employ the lowest dose that gives the desired effect. It is generally advisable to begin with larger doses and then decrease as rapidly as possible.

- Corticotropin USP (ACTH). Many preparations (see pages 424 and 425).
- Cortisone Acetate USP. Available and cost added (see pages 424 and 425).
- Hydrocortisone USP. New available commercially. Hydrocortisone is probably the principal steroid elaborated by the adrenal cortex. It is abundant and of half time as potent as cortisone (see pages 424 and 425).
- Prednisone NND, prednisolone NND. These are derivatives of cortisone. Prednisone is a potent steroid. Recently been introduced. For general information they appear to be similar to the corticosteroids but they exhibit

422 Estrogens and Progesterone

A list of a few estrogens with the most useful dosage in terms of approximately equal physiologic effects is given in the following table

Drug	Dosage and Administration	Comment
Diethylstilbestrol U.S.P. Stillboestrol B.P. Tablets 0.1 0.5 1.0 mg (1500 1/20 1/40 gr.)	0.1 0.5 mg daily by mouth	Synthetic nonsteroidal estrogen. Cheapest excellent preparation
Hexoestrol N.F. Dienestrol U.S.P. Hexatol N.N.D.	0.2 0.5 mg daily by mouth	No advantage over diethylstilbestrol. Generally more expensive
Ethynyl Estradiol U.S.P. Tablets 0.02 0.05 mg	0.02 0.05 mg daily by mouth	Synthetic estrogen. Excellent preparation
Estrone U.S.P. (Theelin)	1 mg 2-3 times weekly or 1000 I.U./daily I.M.	Little used at present. Prefer conjugated estradiols below
Estradiol Valerate N.N.D. (Delestrogen®) (in sesame oil)	10-20 mg I.M. every 2-3 weeks	Long acting estrin
Estradiol Benzoate Injection U.S.P. B.P. (solutions in oil)	0.5-1 mg every other day I.M.	Estrogens for injection are rarely needed
Estradiol Dipropionate U.S.P.	2-5 mg 1-2 times weekly	Slightly longer effect than estradiol benzoate
Estrogen Substances Conjugated N.N.D. (Amnestogen®) Premarin® Coneston®	1-25 2-5 mg daily I.M. or by mouth	Natural estrogen. Rarely indicated

Progesterones

The progesterones are of rather limited use in medicine

A. Effect

1. Leads to the secretory phase of endometrium. Progesterone in the absence of estrogens does not have any significant effect on the uterine muscle or the uterine smooth muscle stimulated (proliferated) by estrogen. In fact, progesterone can antagonize the effect of estrogen.
2. Aids proliferation of breasts.

B. Clinical Use

The progesterone is of rather limited value in clinical medicine. Its main uses are:

1. Production of a normal menstruation. Progesterone may be used with estrogens to maintain a normal menstrual menstruation in women who otherwise cannot menstruate.
2. Medical and C. Another important use of progesterone is to produce the so-called medical dilatation and urethral dilatation. It is usually the effect of adequacy of endogenous estrogen production. It is performed as follows: Give 10 mg progesterone orally daily for 5 days or 125 mg Hydrocortisone orally daily for 5 days. (Dilator®) I.M. or I.V. If menstrual bleeding occurs within 10-14 days of the first dose, it indicates that adequate amounts of endogenous estrogens are being produced.
3. In some cases of habitual abortion.

C Preparations Available Set out below

Preparation	Method of Administration	Dosage
Progestone USP BP	IM	5-10 mg daily
Injectable of Progesterone USP BP	Pellet form plant in Oral tablet	100-200 mg (for habitual or threatened abortion)
Hydrocortisone Cypionate NND (Delalton)	IM 125 mg/c	125-150 mg weekly 2 weeks
Ethisterone USP BP	Oral tablet	60-100 mg daily
Hydrocortisone (Nalatin)	Orally 5 mg tablet	20-50 mg daily (two to four times as per treatment sheet on)
The following table shows the effect of these preparations on the adrenal cortex		

CLINICAL USE OF CORTICOTROPIN (ACTH) AND THE CORTISONES

In the past few years both pituitary adrenocortical (ACTH) and synthetic adrenocortical (cortisones) have been shown to have profound modifying effect on many diseases. The effect is an not only explained at present in the mechanism of the known metabolic and immunological activities of these compounds (see page 411). These agents do not appear to cure. Their action appears to be a modification of cellular activity, permeability, that to us now seems to be a rapid effect. When the drug is discontinued the disease may rapidly recur. No other hormones or combination of drugs is that available. Some daily treatment with the effect of the substances. The disease in which ACTH and the cortisones have been used in sufficient instances to warrant the evaluation is outlined on page 428. It is generally said that these agents are interchangeable, but occasionally a patient is found to be responsive to one of these hormones and not to the other.

Dosages

Dosage varies on the clinical condition being treated. It is advisable to employ the lowest dose that gives the desired effect. It is generally advisable to begin with larger doses and then decrease as rapidly as possible.

- Corticotropin USP (ACTH) Many preparations available (see pages 424-425)
- Cortisone Acetate USP Available under various trade names (see page 424-425)
- Hydrocortisone USP New available commercially. Hydrocortisone is the principal steroid used by the medical profession. It is about one-half the strength of cortisone (see pages 424 and 425)
- Dehydrocortisone NND Dehydrocortisone NND. These are the most commonly used hydrocortisone preparations. They are used for the treatment of the same conditions as the cortisones because they have

CORTICOTROPIN (ACTH) AND CORTISONES

Corticotropin U.S.P. (ACTH) Lyophilized Powder	Mode of Administration	Daily Dose	Remarks
Aqueous Solution	<p>1 V Administer in any 1 V fluid by slow drip for maximum effect at 1 V during entire 24 hour period. May use for 12 hours a day.</p> <p>1 M Administer in saline every 8 hours.</p> <p>Administer as above either 1 V or 1 M. Prepared by diluting with distilled water.</p>	5-40 U.S.P. units	<p>Maximum therapeutic effect No resistance develops if it does occur after 1 M injections 1 V administration is effective.</p> <p>Resistance often develops with continued 1 M use of this preparation. Resistance may occur depending on method of preparation.</p>
<p>Glucocorticoids</p> <p>Respiratory Corticotropin Injection U.S.P. (Corticotropin Gel)</p> <p>Corticotropin Acetate U.S.P. Tablets 5 and 25 mg</p>	<p>Give 1 M or about every 12 hours for maximum effect. May use 1 M dose daily in some patients.</p> <p>Oral administration. Give in divided doses every 8 hours or q.i.d.</p> <p>1 M in dose every 12-14 hours.</p> <p>0.5 or 2.5% ointment into infected eye every 1-2 hours. Ointment every 2-6 hours.</p>	<p>40-200 U.S.P. units</p> <p>As above</p> <p>10-200 U.S.P. units</p> <p>25-200 mg or more</p> <p>25-100 mg or more</p> <p>Variable</p>	<p>No development of resistance</p> <p>Harshly used because of sodium retention. Rapid withdrawal may lead to hypoadrenal crisis. Slowly absorbed and slowly excreted.</p> <p>For local use only.</p>
Hydrocortisone U.S.P. Tablets 5, 10 and 20 mg	Oral administration. Give in divided doses every 8 hours or q.i.d.	20-200 mg (10-40 mg) or more	Similar to cortisone metabolically and about 1 1/2 times potent on a weight basis. It must be given in addition to all other corticosteroids.
Eye Drops 0.5, 1, 2.5% (in ophthalmic solution)	As ointment, etc. every 4-6 hours (see above). May use with antibiotic ointment.	Apply 1-2 drops as directed	For all glaucoma and inflammation. Many patients with glaucoma.
Corticosteroids 0.5, 1, 2.5% (in ophthalmic solution)	Locally to treat inflammation.	Apply 1-2 drops as directed	For all glaucoma and inflammation. Many patients with glaucoma.

1. I.V. 100 mg in 20% solution	I.V. Add to 300 cc or more of saline or glucose	100-200 mg I.V.	Extremely effective at all doses. Must dissolve in at least 500 cc of fluid.
Hydrocortisone hemisuccinate (Solu-Cortef)	Dissolve in 10 cc water. Administer I.V.	100-200 mg I.V.	Water soluble form. For use in emergency cases. May be dissolved in glucose or saline.
Hydrocortisone acetate	Inject intramuscularly. Dose depends on joint size. Do not inject into joints.	10-37.5 mg into joints	Of value in local treatment of rheumatoid and osteoarthritic joints where inflammation is relatively localized.
Hydrocortisone acetate (Hydrol)	For intrathecal use only.	10-37.5 mg into joints	As hydrocortisone acetate. No effect if injected into joint.
Prednisone (Deltasone)	Oral administration. Usual hydrocortisone equivalent is 4 mg prednisone for 25 mg hydrocortisone.	5-50 mg or more (avg 10-20 mg)	Adrenal equivalent of cortisone and hydrocortisone. Does not have significant sodium retaining effect. About 4 times as potent as cortisone in inflammatory effect. Parent drug. Drug of choice.
Prednisolone (Deltacortone)	As hydrocortisone equivalent. For intrathecal use only.	10-37.5 mg into joints	Very effective. Not inflammatory drug. As for hydrocortisone acetate (see above).
Fludrocortisone (Florinef)	For systemic use only.		Very potent. Essential local use in myxedema. Systemic absorption with mineralocorticoid retention (p. 15).
Methylprednisolone (Medrol)	Oral tablets.	4-40 mg or more	1 1/2 times as potent as prednisolone. No therapeutic advantages.
Do not give with specific diseases			

little if any sodium and water retention yet retain all other metabolic and therapeutic effects. Because of their lack of salt and water retention they must be used with even greater caution for the other hazardous effects of cortisone therapy are still present and a common early sign of overdosage edema may be absent.

- E Fludrocortisone Acetate, 9 ND** Usually used only topically (see p. 425) or as supplement for maintenance in Addison's disease.

Duration of Therapy

It appears at present that prolonged administration will be necessary and can be employed safely in many cases. Where knowledge is available regarding recommendations for treatment these are indicated in the text.

Dangers

The side effects are potentially very dangerous. However with proper caution most of these dangers can be overcome. The principal dangers are that these drugs may induce:

1. Hyperglycemia and glucosuria (diabetogenic effect). This is of major significance in the early or potential diabetic.
2. Marked retention of sodium and water with subsequent edema, increased blood volume and hypertension.
3. Negative nitrogen balance with loss of body fluid including bone protein with resultant osteoporosis.
4. Potassium loss with development of a hypokalemic alkalosis.
5. Hirsutism and acne (especially undesirable in females).
6. Cushing's syndrome (may develop with long continued administration).
7. Activation or production of peptic ulcers.
8. Lowering of resistance to infectious agents.

Control of Therapy Employed to Correlate Manifestations

- A Always reduce the dosage as soon as consistent with the clinical response.**
- B Duration is at least 2 weeks for therapy the following should be carefully observed:**
1. Blood pressure
 2. Weight
 3. Initial complete blood count reported as indicated.
 4. Initial sodium intake rate reported as indicated.
 5. Urinary sugar, fasting blood sugar if doing subcutaneous are found in the urine.
 6. Serum potassium and CO_2 should be checked occasionally if large doses of hormone are to be given or more than several days.
 7. Daily eosinophil counts or measurement of urinary steroid excretion if a question of lack of adrenal response to corticotropin arises.
- C All patients should be on high protein diet (100+ Gm protein).**
- D If edema develops place patient on low sodium diet (200-400 mg sodium daily). Mercaptopurine may be employed when strict sodium restriction is impossible.**
- E Potassium chloride 3-15 Gm daily in divided doses should be**

- administered for 1 g daily or high dosage is employed
- F In cases of long continued administration at a rate of one preparation (see page 420) of doses of 10-25 mg daily may be used to counteract the negative calcium and potassium balance
- G Do not stop either drug abruptly. There may be a severe rebound of the disease process. Always remember that cortisone (hydrocortisone) causes atrophy of the adrenal cortex probably through endogenous ACTH inhibition. sudden withdrawal may lead to symptoms of Addison's disease
- C Contraindications and Special Precautions
- A Sterile Pyrexia Glomerulonephritis Corticoid Patient
 receiving corticosteroids especially in the presence of a latent infection. Carefully watch for development of the suppression of endogenous ACTH and subsequent adrenal cortical atrophy. The patient is unable to respond normally to stressful situations (e.g., surgery, infection, etc.). When very high steroid doses are given, the degree of corticoid-induced adrenal atrophy is increased and/or peripheral corticoid and ACTH given. If a corticoid or hydrocortisone is administered during the administration of large doses of corticosteroids, the patient should be watched.
- B Hypertension The age of the patient should be used with the treatment of an individual with damaged myocardium. The increase in renal plasma flow may lead to a decrease in compensation. Always begin with small doses and with patient on low sodium diet.
- C Severe Renal Disease These drugs probably contraindicated in the presence of severe renal disease. The patient is with moderate damage to the kidneys and/or oliguria.
- D Predipositive Psychiatric These drugs cause a number of well-known depressive effects. The patient may have some individual (the predisposing psychoses) may develop an acute psychotic episode when the drug is administered. The patient should be treated or the dose should be lowered and the patient should be fully observed and protected. Psychotherapy must be considered under the influence of the drug.
- E Effect of Thyroid When given in large doses, the drug may depress thyroid function. This may inhibit the action of ACTH on the adrenal cortex and thereby the action of corticosteroids on the tissues of the body.
 Give 100 mg of thyroid 65-100 mg (1-3 g) if the drug is to be given for more than 3-4 weeks.
- F Effect of Pituitary
 1. At the pituitary gland and at the level of the diencephalon of the hypothalamus.
 2. Old patient. These agents do not act directly on the hypothalamus. They should be given in the presence of the disease only as emergency with only with optimum treatment of the primary disease.
 G Tuberculosis At very high doses, tuberculosis may be accelerated in the lungs.
 H Effect of Diuretics Because these drugs tend to lower resistance and the subsequent development of infection, they must be used with extreme caution when appropriate antibiotics are being given. A yeast infection may also occur.

RESPONSE TO CORTICOTROPIN (ACTH) AND CORTICOIDS IN VARIOUS DISEASES

Usually a Markedly Beneficial Effect

1	Rheumatic arthritis	10	Pemphigus
2	Acute rheumatic fever	11	Various allergic
3	Rheumatoid spondylitis	a	Hay fever
4	Still's disease	b	Angioneurotic edema
5	Psoriatic arthritis	c	Drug sensitization
6	Acute gouty arthritis	d	Serum sickness
7	Lupus erythematosus (early disseminated)	e	Asthma
8	Inflammatory eye disease	12	Trichinosis
9	Exfoliative dermatitis	13	Nephrotic syndrome
		14	Ulcerative colitis (acute toxic)

(Only cortisone, hydrocortisone and supplemental hydrocortisone are effective against Addison's disease and pituitary hypopituitarism generally. Only prednisone and prednisolone are effective against the adrenogenital syndrome.)

Results Encouraging But Often Only Transient

1	Regional enteritis	7	Pulmonary granulomas (except tuberculous)
2	Periarteritis nodosa (early)	8	Toxic cytopnasia
3	Scleroderma (early)	9	Chronic lymphatic leukemia (no longer responsive to other therapy)
4	Dermatomyositis		
5	Psoriasis		
6	Alcoholism (?)		

Transient Effect Only

1	Acute leukemia (lymphocytic or granulocytic)	4	Hodgkin's disease (rarely)
2	Multiple myeloma	5	Hepatitis especially hepatic coma
3	Lymphosarcoma		

No Beneficial Effects Established

1	Diabetes mellitus (incapacitating insulin requirement)	8	Conjunctivitis (May be dextrinallergic in some cases but cases secondary to acute arthritis may be benefited through effect of hormone on inflammatory reaction)
2	Myasthenia gravis	9	Chronic myelogenous leukemia
3	Cushing's syndrome	10	Poliomyelitis
4	Amyotrophic lateral sclerosis	11	Osteoporosis (may be detrimental)
5	Progressive muscular dystrophy	12	Acute myelogenous leukemia
6	Progressive muscular atrophy		
7	Multiplesclerosis		

Chapter 17

NEOPLASTIC DISEASES

SOME SUGGESTIONS REGARDING MANAGEMENT OF PATIENTS WITH NEOPLASTIC DISEASES

Suggestions for Diagnosis

- A Early Symptomatology When considering the diagnostic possibilities in patients with neoplasms, symptomatology is important. That neoplastic diseases have an early atypical phase in which they are less easily recognized than in more advanced clinical stages. The importance of early diagnosis cannot be overemphasized. Consider neoplastic diseases in the differential diagnosis of all unsatisfactory problems especially in patients beyond 45 years of age. Do not convey this suspicion of neoplastic disease to the patient however unless it is necessary to discuss it in order to secure cooperation in completing diagnosis.
- B Physical Examination In addition to detailed examination of the suspected areas physical examination must always include careful survey of the skin lymph nodes abdomen breasts and organs and rectum.
- C Internal Examination Endoscopy gastroscopy sigmoidoscopy and myelography of the spine.
- D Special Laboratory and X-ray Studies In addition to CBC urinalysis and total examination the following are useful in the diagnosis of neoplastic disease.
 - 1 Microscopic studies of smears and tissue sections
 - a Biopsy of accessible tumors and/or nodules
 - b Metastatic biopsy
 - c Cytologic examination by means of smears of cells in body fluids (transudates and exudates) and body secretions (e.g., bronchial secretions)
 - 2 X-ray studies. Plain roentgen studies of suspected areas of evidence of primary or metastatic neoplastic disease.
 - 3 Chemical methods
 - a Blood hematology studies (e.g., blood lactate in pancreatic cancer)
 - b Glucose analysis (e.g., hypoglycemia of pancreatic cancer)
 - c Blood and urine electrolytes (e.g., blood phosphorus in prostate carcinoma)
 - d Blood hormones (e.g., blood protein bound iodine in thyroid disease)
 - e Hormone excretion studies (e.g., 17-ketosteroid excretion in adrenal tumor)

- E Surgical Exploration** (e.g. simple incision, thoracotomy or laparotomy). May be indicated as a final evaluation measure. In many cases the surgeon must be prepared to perform a radical surgical operation if macroscopic or frozen section examinations indicate malignant disease.
- F Reexamination** Upon completion of the clinical studies *emphatic reassurance of the patient regarding the negative findings is necessary*. If findings are equivocal the patient should be kept under close follow up observation with appropriate diagnostic measures.

Suggestions for Treatment

A Factors Influencing Choice of Treatment

1. Nature (inherent characteristics) of the given neoplasm: rate of growth, cytological characteristics, inaccessibility (e.g. radiosensitivity or radiocurability), tendency to metastasize, and nature of metastasis.
2. Age of patient.
3. Physical and emotional status of patient.
4. Patient's ability and/or willingness to cooperate with the prescribed therapy.
5. Availability of professional and technical facilities.
6. Stage of the tumor at the time the patient is first seen.
7. Location of the lesion. Proximity to vital or tubular structures.
8. Secondary complications of the disease. Local pressure, symptom, hemorrhage, systemic effects of the primary lesion and the metastasis.
9. Functional, cosmetic and psychological effects of therapy.
10. Patient's ability to tolerate radiation therapy (i.e. tolerance of solar or other radiation).
11. Cost of therapy.

B Treatment of Benign Lesions The physician's clinical impression of the benign character of lesions must always be verified by biopsy and microscopic examination.

1. Simple radiation of the tumor by surgical techniques (including urettag and cauterization) is usually the preferred method of treatment. Radiation technique may occasionally be employed.
2. General indications for removal of benign tumors:
 - a. Diagnostic purposes (possibility of malignancy).
 - b. Pressure on vital structures.
 - c. Obstructive symptoms.
 - d. Mechanical (static) deformities.
 - e. Pain or other marked discomfort.
 - f. Systemic effects (e.g. hormonal).
 - g. Hemorrhage (acute or chronic).
 - h. Cosmetic purposes.
 - i. Psychological purposes (reassurance).
3. More extensive surgery. The surgeon must be prepared to perform radical surgery if macroscopic appearance or frozen section examination indicate malignant disease.

C Treatment of Malignant Lesions

1. Primary lesion
 - a. Complete eradication of the primary lesion by surgical

(including curettage and hysterectomy) or radiation methods must be attempted when ever possible

- b Radical surgery Clinical evidence of regression in metastases may indicate need for radical surgical removal of the primary tumor and the involved nodes
- c Surgical removal of the primary tumor may still be indicated when metastases are systemic but regrowing very slowly (e.g. thyroid carcinoma)
- d Radiation therapy may be used to arrest or slow the progress of the disease if the tumor is radiosensitive
- e Chemotherapy See below

2 Metastatic lesions

- a Steroidalextractions may be of value when lesions are relatively slowly growing painful or when they produce other acute symptoms (obstruction etc.)
- b Radiation therapy is indicated if lesions are radiosensitive and particularly if they are multiple or disseminated
- c Chemotherapeutic methods may be employed using the specific agents which are known to affect certain types of primary and metastatic tumors. The agents are ordinarily withheld until there is definite need for symptomatic relief

(1) Androgenic and estrogenic steroids. Definitive beneficial effects have been observed with the estrogens in some of the endocrine and connective tissue diseases but much of the work remains on an experimental basis. The duration of effect is unknown. Steroid therapy is never curative and should never replace radical surgery of operable carcinoma.

(a) Estrogens. The dose of the estrogenic substance in the individual case depending on the patient's response and the toxicity of the drug (anovulation, edema, edema, edema, edema).

(1) Soft tissue metastases from breast carcinoma (in lungs, brain etc.). Testosterone improves mento-urinary system, percentage of elderly patients. In general, estrogen is given for patients 5 or more years after the menopause. Give Diethylstilbestrol (DES) 5-30 mg (usually 10-15 mg) or Ethinyl Estradiol (EE) 0.2-0.5 mg orally daily. Cyclical administration (1-40 days on, 10 days off) is common.

(2) Prostate carcinoma. Administration (see page 309).

(b) Androgen. Methyltestosterone (U.S.P. 5-10 mg sublingually daily or Testosterone Propionate (U.S.P. 75-200 mg I.M. 3 times weekly per normal body weight) indicated for

(1) Control of the cervix or of the Glands. Complete relief of pain for vaginal prolapse but no objective improvement.

(2) Breast carcinoma. Significant metastatic disease in 15% of cases show improvement but only occasional improvement is observed in soft tissue metastases.

- (2) Nitrogen mustard Although employed with benefit in certain cases of metastatic carcinoma these agents have proved most beneficial in certain diseases of the blood and lymphatic systems (see page 241)
- (3) Mustard like compounds (TEM TEPA) Similar to the above although less toxic (see page 238)
- (4) Antimetabolites (aminopterin 6 M P) See pages 233 239
- (5) Urethane® See page 239
- (6) Radioactive salts Effects are due to radiation rather than chemical action

3 When none of the above procedures is possible

- a Narcotic drugs Liberal but judicious use especially in advanced and terminal malignant disease
- b Surgical measures

- (1) Relief of specific symptoms Surgical intervention (e.g. tracheotomy thoracentesis paracentesis lumbar puncture etc.) may be necessary to control progressive or emergency obstructive or other pressing symptoms
- (2) Nonoperative surgical methods (hormonal modification)
 - (a) Adrenalotomy Bilateral removal of the adrenal glands can sometimes produce a substantial regression of extensive and widespread male and female mammary cancer. Although there is objective as well as subjective evidence of improvement in relief is most often of temporary nature. This is still largely a research technique since it is a major operative procedure expensive and requires careful follow up steroid replacement therapy. The use of this procedure in the treatment of other neoplasms is being investigated but no significant statistics are available at present.
 - (b) Ovariectomy Removal of the ovaries has been demonstrated some time as a treatment for advanced breast cancer. The result of the operation is usually transient and the relative efficacy of the technique has been questioned.
 - (c) Orchiectomy Castration may cause a significant regression of primary and secondary tumors of the prostate and may be best in patients who fail to respond to orchectomy subsequent adrenalectomy may prove to be effective. Subjective and objective relief may be different rather than a year.

D General Problems

1 Explanation to the patient

- a Factors of importance Opinion varies greatly as to whether or not it is advisable to inform patients that they have malignant neoplasia etc. This matter must be individualized and must naturally vary with the temperament intelligence attitude and desires of the patient. Under certain circumstances it may be necessary or advisable to inform the patient as to the true nature of his condition in respect of the above factors.
- (1) If the patient demands an explanation of his illness

- (2) If the patient's economic status requires so warning to permit proper disposition of assets
- (3) If the patient refuses to carry through on a prescribed diagnostic and/or therapeutic regimen
- (4) If the neoplasm is growing relatively slowly and noninvasive and is readily treatable
- (5) If the patient exhausts (or threatens to exhaust) his finances in a search for a cure

■ **Manner of explanation.** If explanation is indicated use mild terms such as growth, lump, or even tumor, but in most cases it is advisable to avoid the term *cancer*. Be guarded in statements as to prognosis and lean toward the optimistic and always *offer a ray of hope*. When the clinical situation is not utterly hopeless, cheerful optimism and reassuring attitude may do much to allay the fears and apprehensions of the patient and the family.

2 **Explanation to the family.** It is often advisable to inform a near relative (preferably the mother when this is feasible) of the nature of the illness and the prognosis. The qualifying information should be kept in mind in deciding who, how, and when to tell.

3 **Provisions for bereavement and terminal care.**

a **Assessment of social significance.** In view of the complexity and the psychological and socioeconomic implications of the illness, the help of a medical social worker is advisable in proper case.

b **Hospital or nursing home.** May be indicated.

c **Home.** If patient and family decide on home care, it will be necessary to instruct some members of the family in the technique of administration of drugs (especially parenteral narcotic).

TREATMENT OF ADVANCED MAMMARY CANCER

	Prem menopausal	Postmenopausal
<p>EXCISION OF GONADS (OVARIECTOMY)</p> <p>↓</p> <p>Eliminate ovarian function</p>	<p>Improvement in survival by less than 8% in this study. This method is seldom used.</p>	<p>Eliminate ovarian function</p>
<p>OVARIAN IRRADIATION</p> <p>↓</p> <p>Eliminate ovarian function</p>	<p>Best results in survival when combined with systemic therapy (89%) and pulmonary and pleural metastases (50%).</p>	<p>Less effective than systemic therapy</p>
<p>ANDROGENS</p> <p>↓</p> <p>Progestin therapy (1%)</p> <p>Ovarian progestin</p>	<p>Symptoms relieved 68% of patients and objective improvement in survival in 20% of patients. Progestin therapy prolongs time of life with prolonged effect.</p>	<p>Ineffective</p>
<p>ESTROGENS</p> <p>↓</p> <p>Empirical therapy</p>	<p>Very little evidence. Only a small number of patients.</p>	<p>Objective improvement in survival about 80% of patients. Subjective improvement in survival about 25% of patients. Prolongation of life.</p>
<p>ADENAELECTOMY (BILATERAL)</p> <p>↓</p> <p>Eliminate production of androgens and estrogens (progestin therapy and D O C A administration)</p>	<p>Ineffective</p>	<p>Subjective improvement in survival about 25% of patients. Objective improvement in survival about 10% of patients.</p>

Chapter 18

VENEREAL DISEASES

SYPHILIS (Lues)

An acute or chronic disease caused by infection with *Treponema pallidum*. It may be either congenital or acquired. The acquired form of the disease is usually transmitted genitally but may be acquired by extragenital routes.

DIAGNOSTIC FEATURES

Primary Syphilis (code No 147)

- A History of contact with an infected individual 1-8 weeks (usually 3-4 weeks) prior to appearance of primary lesion.
- B Primary lesions are pleomorphic, may be single or multiple and are usually located on the external genitalia although extragenital lesions are not rare (10-15%).
- C Three or more carefully performed dark field examinations (on successive days) are necessary before a final report of negative may be made.
- D Both complement fixation (e.g., Kolmer) and precipitation (e.g., Kahn) tests should be performed. Quantitative blood tests (performed by a reliable laboratory) when they may demonstrate changing titer are preferred for both diagnostic and follow-up purposes.
- E Regional lymph nodes on one or both sides are often rubbery, discrete and non-tender.

Secondary Syphilis (code No 013-147)

- A Usually occurs 7-10 weeks after exposure to the disease and 2-3 weeks after appearance of the primary lesion.
- B There is often evidence of systemic involvement with fever, generalized lymphadenitis, non-pruritic maculopapular dermatitis, nasopharyngitis, laryngitis, conjunctivitis, alopecia, arthritis, mucous patches and condylomata.
- C Blood tests for syphilis are almost invariably trophic positive.
- D Cutaneous and mucous membrane lesions may show *T. pallidum* on dark field examination.
- E Spinal fluid usually shows transient involvement.

Relapsing Syphilis

- A Usually occurs within 6 months to 2 years after onset of the disease.

- B Often follow in adequate or improper therapy (e.g. penicillin for congenital gonorrhea)
- C Blood tests for syphilis usually revert to a positive reaction or if already positive to an increasing serologic titer (based upon quantitative blood tests)
- D Relapse may be of a venereal clinical type. The commonest of these is mucocutaneous CNS syphilis and serological (the latter in the absence of clinical evidence)

Late (Tertiary) Syphilis (cod No 400 147) (Early latent less than 4 years late more than 4 years)

An intermediate opportunistic phase after secondary lesion may develop and while tertiary symptoms are not yet visible:

- A Latent syphilis often shows no clinical evidence of lesions other than the positive blood test. It is therefore important to retest if a positive blood test the most common cause of which are technical or intercurrent acute infectious mononucleosis malaria leprosy leishmaniasis smallpox vaccination lymphogranuloma venereum syphilis erythema toxicum thrombocytopenia and biological false positivity

Never make a diagnosis of latent syphilis solely on the basis of a single blood test. Rule out the possibility of the above factors. If the blood test is only very transiently and weakly positive the diagnosis of lues should be questioned. Conversely if the blood test is persistently positive for 3 or more months lues is the most likely diagnosis.

- B Spinal fluid must be completely negative
- C The treponema immobilization test (TPI) and the Treponema pallidum complement fixation test (TPCFT) although not available for routine use will distinguish biological false positive reactions from true syphilitic reactions and should be employed in all instances of doubtful diagnosis

Late (Tertiary) Syphilis (cod No 014 147)

It is important to differentiate between the following types of late syphilis which may be clinically distinguished by anatomical lesions (gummas) in any and all organs:

- A Mucocutaneous. Gummas are lesions of the skin and mucous membranes
- B Bone. Diffuse or gummatous lesion of bone and joints with possible arthritis synovitis and osteomyelitis
- C Ocular. Conjunctivitis iritis vitritis choroiditis retinitis and neuroretinitis
- D Vascular (excluding cardiac). Gummas or diffuse involvement of the brain lungs spleen kidneys and testes
- E Cerebrovascular
 - 1 Uncomplicated aortitis (cod No 451 147)
 - 2 Aortic aneurysm (cod No 435 147)
 - 3 Aortitis (cod No 461 147 d)
- F Neurosyphilis
 - 1 A symptomatically late syphilis characterized by spinal fluid abnormalities (Gomori index ≥ 450) but without evidence of symptoms or signs of neurological involvement

Spinal Fluid Findings in C N S Syphilis*

Group and Degree	W B C per cu mm.	Pandy's Test	Total Protein (mg per 100 cc)	Complement Fixation Test	Colloidal Gold Test
I Mild or minimal	8 or more	- or ±	5-50	- or ±	0000000000 to 2210000000
II Intermediate or moderate	8-200 or more	± or +	40-100	± or + with 1 cc of fluid	0012210000 to 3332100000
III Severe or maximal (paretic)	8-200 or more	± or +	40-300	+ with 0.1-0.5 cc of fluid (strongly positive)	555431000

* Spin. l fluid must be non bloody

- a May be classified according to C S F changes (see above) as mild moderate or severe (Groups I II or III)
 b If untreated may develop into clinical neurosyphilis
 May occur during any phase of life

2 Symptomatic

- a Acute syphilitic meningitis (code No 912 147 0)

- (1) Usually occurs within 2 years after infection
- (2) Clinical picture of low grade meningeal irritation
- (3) Spinal fluid Group I and II changes
- (4) Often follow inadequate treatment

- b Chronic syphilitic meningitis (code No 912 147)

- (1) Usually occurs 2-20 years after infection
- (2) Clinical picture varies considerably according to portion of C N S involved
- (3) Spinal fluid Group I and II changes (see above)

- c Diffuse meningovascular (code No 910 147)

- (1) Involve both meninges and blood vessels Vascular thromboses are frequent
- (2) Clinical picture varies with C N S localization of thromboses and includes both neurological and psychiatric manifestations Repeat thromboses may occur
- (3) Prognosis is usually good with treatment
- (4) Spinal fluid Group I and II changes occur (see above)

- d Tabes dorsalis (code No 908 147)

- (1) Usually occurs 2-20 years after infection
- (2) Involves dorsal spinal cord and columns midbrain saccular ganglia and autonomic nervous system
- (3) Clinical picture includes ataxia pains of varying character and location visual and auditory disturbances pharyngeal and sexual disturbances pupillary changes optic atrophy hyporeflexia diminution of vibration and position sense and other sensory disturbances
- (4) Spinal fluid Group I and II changes occur in the earlier stages of the disease changing little to Group III abnormalities although the C S F may be completely normal (see above)

(5) Blood test for syphilis are positive in 50-75% of cases of tabes

e Taboparalysis (code No 906 147 9) Combines clinical features of tabes and paresis Spinal fluid is variable

f General paresis (dementia paralytica) (code No 00 147)

(1) Usually occurs 2-20 years after infection

(2) A syphilitic meningoencephalitis

(3) Clinical picture variable but may include mental deterioration, personality and behavior disturbances convulsions paralysis weakness tremors pupillary changes speech defect hyperreflexia and other evidence of motor neurone involvement

(4) Spinal fluid Group III changes occur (see pag 438)

(5) Blood tests for syphilis are positive in 100% of cases of paresis

g Optic atrophy (code No 962 147 9) Disc pallor visual field disturbances and altered visual acuity which in untreated cases progresses to blindness

Congenital Syphilis (code No 010 1471)

The clinical manifestations of the congenital disease are quite similar to those of the acquired form except for the atheroindurative lesions and the absence of primary or initial lesions

A Evidence of fetal hemorrhage of liver

B Skin and mucous membrane lesions at birth or in early infancy

C Characteristic stigmata of congenital disease such as interstitial keratitis Hutchinsonian star of the Eberle and

Hutchinsonian star of the Eberle and Hutchinsonian star of the Eberle and Hutchinsonian star of the Eberle and

D Blood test for syphilis usually strongly positive at birth but gradually become negative over a period of years

E Any of the tertiary sequelae of the adult disease (CNS, vascular or other lesions) may occur

TREATMENT OF SYPHILIS

General Measures

A Public Health Measures

1 In cooperation and usually periodic surveillance with the local health authorities should be some how isolated and antineurosyphilitic and infectious by prophylactic antineurosyphilitic therapy

2 Report the infection to appropriate public health agency

B General Management

1 Completely rest physical status of patient prior to institution of prophylactic therapy

A Full physical examination chest x-ray and fluid cerebrospinal fluid analysis and blood count are advisable prior to institution of antineurosyphilitic therapy Spinal fluid should be examined in all patients with latent or late disease

2 Mental disturbance relieved by adequate diet rest and correction

C Local Measures (mucous membrane)

1 Local treatment of lesions by means of

- 2 No local antiseptics or other chemicals should be applied to a suspected luetic lesion until repeated dark field examinations have been made. If after the diagnosis has been established the luetic lesion should become secondarily infected the lesion may be treated as for any pyogenic ulceration (this in addition to systemic antiluetic treatment see page 84)

Prophylaxis

- A Sex Education Instruction along the lines of sexual education is to be desired. Avoidance of illicit sexual contact is the surest of all prophylactic methods.
- B Mechanic The standard rubber condom is effective but protects covered parts only. The exposed parts should be washed with soap and water as soon after contact as possible. This applies to both sexes.
- C Antibiotic If there is known exposure to infectious syphilis abortive penicillin therapy may be used. Give 1,200,000 units of repository penicillin I.M. in one dose.

Recommended Treatment Schedules for Various Forms of Syphilis

- A Primary and Secondary Adult Syphilis Repository penicillin 500,000 units I.M. daily for 10 days (5,000,000 units).
- B Infectious Erythema Treat again as for primary or secondary syphilis. Diagnosis is made if careful follow-up examination reveals sustained or rising titer on serial quantitative biweekly or monthly blood tests or if there is actual clinical evidence of erythema (mucous membranous lesions of mouth and ano-genital regions and skin lesions especially on palms and soles and rotum).
- C Latent Syphilis There are no clinical manifestations in latent phase and the C.S.F. is negative. The only positive criterion for this stage of the disease is the positive blood test. Only a small percentage of these blood titers however will be appreciably altered by treatment with penicillin. The treatment of this stage of the disease is intended to prevent the late sequelae.
- D Asymptomatic Neurosyphilis Benign Late Syphilis Visceral and Cardiovascular Syphilis Optimal dosage schedules of penicillin have not been completely established in these stages of the disease. Hazards of penicillin therapy (Herxheimer's reaction or therapeutic paradox) are minimal but the ultimate outcome of treatment is difficult to determine. The following dosage schedule is recommended: Repository penicillin 500,000 units I.M. daily for a total of 12,000,000 units.
- E Symptomatic Neurosyphilis
 - 1 Preventive neurosyphilis by establishing early diagnosis and by providing adequate treatment and follow-up of early syphilis. Examination of all syphilitic patients for evidence of nervous system involvement must be a regular part of the follow-up examination.
 - 2 The pre-treatment clinical and laboratory evaluation should include detailed neurological, ocular and psychiatric examination and a cerebrospinal fluid examination. The high rate of coexistence of cardiovascular and C.N.S. lesions should be considered.

3 Treatment method

a Penicillin treatment Penicillin is the treatment of choice in primary syphilis. Penicillin G (penicillin G) 600,000 units I.M. daily to a total of 12,000,000 units may be given.

b Other method The various schedules of metallothiopyrimethamine will be omitted here because they have become obsolete.

- 4 Follow-up examination All patients must have a spinal fluid examination throughout the following completion of antilithic therapy. The general adequacy of response to treatment is at times difficult to evaluate (especially during a short period of observation) but it may be gauged by clinical improvement. Ineffective adjuvant treatment results of C.S.F. changes. A second course of penicillin therapy may be given if necessary.

F Penicillin Syphilis

1 Make it a top priority patient who requires the urgent necessity for antilithic therapy. Then make certain that appropriate treatment is carried out.

2 Immediate treatment is important. Dosage schedules as advised for primary and secondary syphilis are satisfactory. When the spirochete is instituted late in pregnancy (1 month after the 7th month) in women with untreated early syphilis, the larger dose of penicillin is advised. Dosage schedules as outlined for symptomatic neurosyphilis and for cardiovascular syphilis are recommended. Remember that penicillin treatment may bring about cures in more than 90% of cases even when syphilis is discovered in the latter trimester of pregnancy.

3 Follow-up must consist of monthly physical examination and quantitative blood serological test for syphilis (S.T.S.) until and for a month after delivery. If there is a significant clinical evidence of relapse, failure of follow-up blood S.T.S. titers or a fall of S.T.S. titers, treatment should be repeated. It is important to be sure that the evidence will necessarily be a very slight serological reactivity in month with late latent syphilis by any test method. If the mother has previously untreated disease, it is likely to be early latent syphilis and the original S.T.S. titer does not significantly decline within 3 months after treatment. Treatment is advisable.

4 The newborn infant should be examined for stigmata of syphilis and should be treated to 2 to 3 weeks interval for 4 to 6 months. If the maternal blood is positive, positive cord blood S.T.S. is a diagnostic sign. However, if the infant's blood is followed serially by quantitative blood S.T.S. titers to 2 weeks interval for 4 months, a sustained or rising S.T.S. titer would indicate a diagnosis of congenital disease and a need for treatment.

Spinal Cord Infection - Meningoencephalitis - Penicillin Therapy

a High-dose penicillin therapy. If a meningitis occurs with meningitis, equine and constant of fever and general headache and pain within 24 hours after onset of the spirochete.

b Some clinicians feel that in late syphilis it is necessary to administer a course of bismuth and iodide prior to penicillin.

therapy in order to diminish the hazard of H. Reiter's reaction or therapeutic paradox. These dangers if they exist at all are minimal.

- Sensitivity to penicillin (see page 505) contraindicates further use. One of the other antibiotics may be given (see below).
- ▷ Relapses following one or more courses of penicillin therapy requires consideration of other therapeutic agents.

Chlortetracycline (Aureomycin®) Treatment Methods

Oral Chlortetracycline Hydrochloride U.S.P. (Aureomycin®) has been reported to be effective in the treatment of syphilis but clinical experience with the drug is not extensive. Optimal dosage schedules, toxicity, failure rates, etc., remain to be determined. One Gm. every 4 hours day and night for a total of 70-80 Gm. has been suggested. Its use may be considered in those patients sensitive to penicillin. Tetracycline U.S.P. (Achromycin® Tetracycl®) may be used instead of chlortetracycline in a similar dosage.

DIFFERENTIAL DIAGNOSIS OF VENEREAL DISEASES

Disease Organism and How Demonstrated	Test	Lesions	
		Bubo	Genital
Syphilis <i>Treponema pallidum</i> (Dark field exam)	Complement fixation (e.g. Kolmer) and precipitation (e.g. Kahn) tests	Non-fluctuant	Painless ulcers
Chancroid <i>H. morph. ducreyi</i> (Gram stain)	Skin test with Ducrey antigen	Usually fluctuant	Painful ulcers
Lymphogranuloma venereum virus (Culture methods)	Complement fixation tests Frei test	Usually fluctuant	Painless vescent lesions
Granuloma inguinale Donovan bodies? (Wright stain)	None	Usually none	Painless spreading ulcers
Gonorrhea (Gram stain) Neisseria gonorrhoea	Complement fixation (value?)	None	Urethritis

GONORRHEA

Gonorrhea is an acute or chronic infectious disease caused by the gram-negative diplococcus *Neisseria gonorrhoeae* and practically always transmitted among adults by sexual intercourse. Acute gonorrhea in the adult male is characterized by an acute urethritis with painful urination and purulent urethral discharge. Chronic gonorrhea may be manifested by chronic inflammation of the urethra, prostate, epididymis and seminal vesicles but rarely if ever of the upper urinary tract. Gonorrhea in the female begins in the urethra, vagina and vaginal glands and is characterized by painful urination and purulent discharge. Commonly the infection spreads to the uterus, tubes and other pelvic structures causing abdominal pain and is associated with evidence of constitutional symptoms. Systemic infection with septicemia and manifested by endocarditis or arthritis is less common. There is a strong

affinity for the ocular mucous membranes and may cause a serious and blinding ophthalmia

Diagnosis

A History of genital discharge and dysuria occurring 4 to 10 days following sexual intercourse with an infected individual. Symptoms will vary with the anatomic structures involved. Demonstration of the gram negative intracellular diplococcus in exudate from lesions by staining (Gram's or methylene blue) makes and by culture. Blood cultures may be positive in patients with pyemia. Complement fixation tests may be positive several weeks after the initial infection.

B 1. Gonorrhea Involvement

1. Urethritis (code No. 744 103)
 - a. Smear and if necessary culture of material obtained from the urethral meatus will demonstrate the causative organism. This is obtained by urethral tripping and never by any other method of rubbing the urethra. The discharge is usually in the chronic phase.
 - b. Two glass test tubes for urethritis. Cloudy thin condiments. Both glasses contain shreds. Clinical symptoms remain soft and diffuse. Potassium permanganate may be used. Mild.
2. Postitis (code No. 744 103). Urethral discharge may or may not be increased. Smear and culture findings will be as above. Painful micturition is common and increased by defecation. Local pain may be present. Constitutional symptoms are as fever and chill may be present. Dysuria is frequent and intense micturition.
3. Acute epididymitis (code No. 756 103). History of urethritis. Smear and culture findings as above. There is also testicular pain, swelling, warmth and tenderness.

C Femoral Gland Involvement

1. Acute urethritis (code No. 740 103). Smear and (preferably) culture of urethral and gonadal discharge should be performed. There is redness and swelling of gonadal bulb and external meatus.
2. Chronic gonorrhea infection (after 4 to 6 weeks).
 - a. Very full and painful ducts and tenderness of micturition. Infection of Skene's, Bartholin's or paraurethral glands (For treatment see U.S.P.H.S. VD bulletin 97, 1945).
 - b. Bilateral inflammation (code No. 066 103) may be hastened by lower quadrant abdominal manual treatment. Mild perineal irritation and systemic manifestations.

Treatment

Penicillin, streptomycin, histamine (Auromyon[®]) and thioamides (T-mycin[®]) and the sulfonamides are all effective against gonococci although penicillin is usually the drug of choice.

A. Acute Chronic Urethritis and Urethral (male or female) (code No. 740 103). Avoid all local treatment such as irrigations, manipulations and instillations.

- 1 **Penicillin therapy** Several effective techniques are available ALWAYS draw preliminary blood specimen for serological test for syphilis and examine patient clinically for evidence of syphilis since the danger of masking early syphilis by penicillin treatment is very real Give repository penicillin 600 000 units I M on 2 successive days
- 2 **Alternative therapy** If coincident lues is suspected the above treatment should be altered as follows
 - a Penicillin Repository penicillin 600 000 units I M daily for 10 days
 - b If the patient is allergic to penicillin give one of the tetracyclines 1 0 Gm orally Stat then 0 5 Gm at 6 hour intervals for 4 6 doses
- 3 **Follow up** Should consist of examination of the patient at weekly intervals for at least 3 weeks or preferably
 - a Weekly examination for evidence of urethral discharge chancre or rash
 - b Stained smear and if possible culture of any inflammatory exudate weekly Avoid prostatic massage urethral sounds or instrumentation as a means of obtaining material for examination in acute cases
 - c Blood test for syphilis and examination for clinical evidence of lues at the end of the third week and again at 3 6 12 and 24 months
- 4 **Re-treatment of penicillin failures** (suspect other etiology) If any of the weekly checks shows bacteriologic evidence of persistent gonorrheal infection repeat penicillin treatment as above Consider possibility of serologic complications If such can be reasonably excluded may treat with
 - a Increased dosages of penicillin
 - b Streptomycin 5 Mite U S P 0 3 0 5 Gm I M as a single dose
 - c Chlorotetracycline Hydrochloride U S P (Aureomycin®) 1 0 Gm orally Stat and the 0 5 Gm at 6 hour intervals for 4 6 doses
 - d Oxytetracycline U S P (Tetracycline®) 1 0 Gm orally Stat and 1 0 Gm repeated in 6 hours
- 5 **Persistent failures** Often successful treatment of illness as a tertiary reactions this be associated with large has come to believe that modern treatment methods have now rendered the disease treatable The danger of such a concept must be made apparent to the patient
- B **Acute and Chronic Prostatitis** (code N 764 103) Treat as above Hot sitz bath and alkalization of the urine may provide symptomatic relief
- C **Acute Epididymitis** (code No 756 103) Above treatment in addition to
 - 1 Bed rest
 - 2 Cold compresses to scrotal region
 - 3 Analgesics for relief of pain
 - 4 Supporter to be used during convalescent ambulatory phase
- D **Pelvic Inflammatory Disease** (Acute Gonococcal Salpingitis code No 787 103)
 - 1 Acute
 - a Absolute bed rest

- b Do douches or unnecessary manipulation during acute phase
- c Examine carefully for clinical evidence of lues. Draw blood for serological test
- d Repository penicillin 800 000 units I.M. daily for 5-10 days
 - (1) Convalescent period - If patient becomes afebrile and asymptomatic he may be permitted bed rest until WBC and sedimentation rate become normal (may take a month or more). Observe the patient during and following her next menstrual period for pain and pelvic changes. If these are absent discharge her to home center on the convalescent program outlined below
 - (2) Retreatment - If symptoms of leukocytosis increased sedimentation rate or positive vaginal smear persist or if they recur at the time of menstruation administer a second course of penicillin
- e Retreatment - If the patient fails to respond to 3 courses of penicillin therapy give one of the tetracyclines 1.0 Gm orally 5 times then 0.5 Gm at 6 hourly intervals for 4-6 doses
- f Convalescent program - After the patient is discharged from the hospital give the following instructions
 - (1) Sedentary life
 - (2) No sexual intercourse until signs and symptoms have completely cleared (usually takes about 6-8 weeks)
 - (3) Douches - Prolonged douches of warm tap water using 1-2 g lino and administering slowly and gently over a 15-20 minute period 2 or 3 times daily. The patient can perform this procedure most effectively while sitting in the bathtub
2. Subacute (or acute exacerbation of chronic form)
 - a Absolute bed rest until signs and symptoms have cleared
 - b Douches as above
 - c Penicillin may be less effective in this phase of the disease but trial of therapy is warranted (as above)
3. Chronic (chronic gonococcal proctitis) - Code No. 787.103.00
 - a Bed sitting - to exclude blemishes
 - b Penicillin usually ineffective but hold betide
 - c Other antibiotics should be tried
 - d A course of pelvic diathermy treatment may be of value
 - e Surgical procedures may be dictated. This decision should be made by a gynecologist. Result of surgery or of any therapy

GRANULOMA INGUINALE (code No. 146.192)

A chronic granuloma disease caused by infection with *Dona* *g* *anul* *matie* *apl* *m* *phic* *odit* *2* *μ* *in* *l* *gth*. It is manifested by painful sharply defined reddish erosions and ulcerations with bleeding and granularomatous infiltration of the skin or mucous membranes of the genital region. If untreated the lesion gradually extends to involve the surrounding tissues and later the adjacent areas of the abdomen and thighs. It rarely involves deep structures. There is usually no lymphadenopathy. Lesions are

heal spontaneously although the process may remain stationary for years. Deep tissue scrapings or punch biopsy of clean peripheral granulation tissue should be stained with Wright's stain and examined for Donovan bodies (see Table on page 442).

Treatment

- 1 Chlorotetracycline Hydrochloride \equiv S P (A reomycin®) Oxytetracycline \equiv S P (Terramycin®) and Chloramphenicol \equiv S P (Chloromycetin®) are all effective. 1 Gm daily for 12 weeks may be tried.
- 2 Streptomycin Sulfate U S P is highly effective. It may be contraindicated by the danger of damage to the vestibular apparatus. If tried it may be used in a dose of 1 Gm 1 M daily until the lesion is healed (10 or more days).

LYMPHOGRANULOMA VENEREUM (code No 1198) (Lymphogranuloma Inguinale or Lymphopathia Venereum)

Lymphogranuloma venereum is an acute or chronic venereal disease caused by a specific virus. It is characterized by minimally herpetiform genital lesions and may be complicated by regional lymph node involvement and at times by variable constitutional reactions.

The incubation period is one to three weeks. Initial lesions are painless to unnoticed herpetiform or ulcerative and may appear on any part of the external genital area. Inguinal buboes appear 1-6 weeks after infection and are often bilateral and may or may not be suppurative. The nodes may fuse, soften and break down forming multiple sinistral tracts. Extensive arrhythmia may occur. Chronic anorectal disease manifested by rectal pain and inguinoanal discharge and rectal strictures is more frequently encountered in male than in female patients. Constitutional reactions frequently accompany the stage of bubo formation and are characterized by fever, chills and prostration, malaise and neurologic manifestations. Consider this disease as a possibility in undiagnosed cases.

The skin test (Chick embryo antigen) is of value. If suspicious lesions are of 3-4 weeks duration a negative result probably rules out lymphogranuloma venereum. A positive skin reaction may mean an active infection past (old) infection or a latent viral infection (false positive). The enzyme assay of the albumin globulin ratio in the serum Complement fixation test are valuable. Always rule out the possibility of primary syphilis (see page 436). False positive (usually weakly positive) blood tests for syphilis may occur.

Treatment

A Specific Therapy

- 1 The tetracyclines and Chloramphenicol U S P (Chloromycetin®) \equiv 25-10 Gm (3 3/4-15 g) orally q.d. for 5-14 days are the treatments of choice. Sulfadiazine U S P or Sulfathiazole \equiv F 10 Gm (15 gr) t.i.d. for 2-3 weeks or longer probably has no effect against the virus but is effective in preventing secondary complications.

B Local Measures

- 1 Bed rest (provides local comfort)
- 2 Warm fomentations to the affected area for discomfort
- 3 Analgesic per os
- 4 Aspirin: fluctuant nodules under aseptic precautions (see below). Incision and drainage are to be avoided (to prevent lymphatic obstructions)
- 5 Proctoscopic examination for diagnosis and for late evaluation of changes
- 6 Extensive plastic surgical repair operations may be necessary in the chronic and rectal form of the disease. Rectal stricture should be treated by prolonged gentle dilation. Although in extreme cases this may be impossible and colon-shunting procedures may be necessary.

CHANCROID (Soft Chancre)

(Of Penis: code No 751 10x) (Of Vulva: code No 774 10x)

A venereal disease caused by *Histophilus ducreyi* and manifested by painful genital ulcer or ulcers, often complicated by suppurating inguinal lymph nodes (buboes). Incubation period is from 3 to 5 days (range 2 to 7 days?) following venereal exposure. The inflammation begins as a small vesicopustule which ruptures to produce a shallow necrotic undermined ulcer. Single or multiple indurated ulcers may occur. Adphimosis may result. Regional lymph nodes become enlarged in a few days; 2 weeks later usually unite to soft fluctuant and tender. The nodules may rupture or may subside spontaneously. Giemsa stained smears from the ulcer show *Histophilus ducreyi* which may also be cultivated from pus from the lesions of the bubo. Syphilis must be excluded by the diagnostic measures outlined under the diagnosis of syphilis (primary). The two diseases may coexist.

Treatment**A Specific Therapy**

- 1 Sulfadiazine USP or Sulfasole USP (Gentrisin®) 1.0 Gm (15 gr) qid for 1 week. Observe urine for sulfonamides with the Fehling's test (see page 501).
- 2 Chlorotetracycline Hydrochloride USP (Achromycin®) or Oxytetracycline USP (Tetracycline®) 0.5 Gm twice daily for 5-7 days.

B Local Therapy

- 1 Careful irrigation with soap and water bid (after diagnosis has been made) will suffice. When lesions fail to heal promptly, a potassium permanganate solution may be used.
- 2 Fluctuant buboes may be aspirated with a large gauge (No 16) needle as indicated. Warm compresses or hot water bottle may be applied to the groin for relief and to hasten fluid absorption and resolution of bubo.

Chapter 19

INFECTIOUS DISEASES

DISEASES DUE TO VIRUSES

MEASLES (Rubeola) (code No 010 189)

An acute highly communicable virus infection characterized by inflammation of the respiratory tract conjunctivitis Koplik's spots and a blotchy rash

The prognosis is generally good Secondary infection by bacteria is common but responds readily to appropriate treatment The fatality rate of post-measle encephalitis is 30 per cent and those surviving frequently have residual damage

Diagnosis

Incubation period 10 days A prodromal period of fever cough and conjunctivitis precedes the rash by about 4 days Koplik's spots usually appear 2 days before the rash A blotchy rash appears on the face on the first day spreads to the trunk on the second and to the extremities on the third and fourth days Leukopenia present

Measles is most contagious just before and during the prodrome it remains contagious but less so for about a week after the appearance of the rash

Treatment

A Specific Measure None available

B General Measures

- 1 Isolate for the week following onset of rash
- 2 Bed rest until afebrile
- 3 Aspirin as necessary for analgesia
- 4 Slin eye ointment for symptomatic relief of conjunctivitis
- 5 Vasoconstrictor nose drops
- 6 Sedative cough mixture if necessary (see 110)

C Treatment of Complication

- 1 Secondary bacterial infection of the middle ear throat larynx or lungs are treated with appropriate sulfonamides or antibiotics (see 514)
- 2 Post-measle encephalitis (code No 930 189) may only be treated symptomatically
 - a Lumbar puncture for relief of headache pressure
 - b Anticonvulsants as necessary (see 351)

P_{rophylaxis}

A ti e prophylaxis is n t pract cal but passive p otection or modification may be accomplished

- A C mpl is tempo ary prote tion of xposed s ceptibles usually f llow d m nst t o b f r the sixth day of incubation o 20 cc of conv lescent serum 2 to 10 cc of immun serum globulin (gamma glob lin) o 3 to 10 cc of human immune gl bulin (pla ential immun) I M
- II Modification of the disease followed by p mane t immunity usually ults from the inj tion of half th above doses on th fifth t seve th days qual doses o the eighth day or d ble doses o the ninth o tenth days following exposure

RUBELLA (German Measles) (code No 010 165)

R bell is sn s te immunucable dise s of viral origin charact ed by ra h and lymphad nopathy

Diagno is

Th in batio p riod i 2 to 3 weeks A short p odromal period of malais o a hi g in the post ior cervical nodes may p e e the fi p ula erupts which appears usually fi at n the f e and quickly sp e d to the t unk and ext m ties S boc pital and p st ri cervical ad ntis is ually p essent Leukop nia is ge rally noted Pate is a probably infectious d ring th p o d m and du ing the e ptio

T_{reatment}

- A Specific Meas s None
- B G I M s Asp in fo m lai lf q i d
- C T_{reatment} of C mpl at one
- 1 Fetal bno m lity f q e tly found if the dis s oc urs d ing the f t o ly in the econd trum t of p g m y (S Prophylaxis)
 - 2 En ph iti (cod N 930 165) d th ombo ytopenic p r (cod No 516 165 9) e ve y ra Tre t sympt m tically
 - 3 S o d ry t pto oc al inf tion may occur a d ho ld be t t d with p illin (p 481)

P_{rophylaxi}

P gna tw m n who h ve b xp d to B lla may b giv n 5 20 f immune s rum globuli (gamma globulin) I M in an ff rt to p ev nt o m dify the di

VARICELLA (Chickenpox) (code No 010 161)

Varic lla is an s ut commun dle dis e us d by a virus kin to that of h rp t III i ha act ri d by th e uption of ops of skin i ion

D_{gnosis}

Th in batio p riod i to 3 weeks (usually 17 day)

Prodromal symptoms are usually slight and last only one day. Lesions erupt in crops and progress through the maculopapular, vesicular and pustular stages to crusts in about 3 days. The eruption is usually centripetal in distribution. The patient is infectious for one day before the onset and for 6 days thereafter. Late crusts may also occasionally be infectious.

Treatment

A Specific Measures None available

B General Measures

1. Isolate until primary crusts have disappeared
2. Bed rest until afebrile
3. Cleanliness of skin by frequent tub baths or showers when afebrile
4. Calamine lotion locally and antihistaminics orally may relieve the pruritus

C Treatment of Complications

1. Secondary bacterial infection of the lesions may be treated with bacitracin, tyrothricin or penicillin ointment locally. If extensive, penicillin I.M. may be given.
2. Post-varicella encephalitis may be treated only symptomatically.

Prophylaxis

Temporary passive protection is regularly followed by I.M. administration of 20 cc of convalescent serum, but this is rarely warranted.

SMALLPOX (Variola) (code No. 010 176)

Smallpox is a serious communicable febrile disease characterized by rapid onset of constitutional symptoms followed by an eruption most marked on the face and extremities and often involving the mucous membranes.

The prognosis is extremely variable and depends on several factors. Previous effective vaccination prevents or modifies the infection. In cases with high fever and in confluent and hemorrhagic types of smallpox the prognosis is poor. The virulence of the virus in epidemics is quite variable. If complications are present the prognosis worsens. The amount of scarring is variable but is more marked with secondary infection.

Diagnosis

The incubation period is 7 to 21 days. The prodromal illness lasts 2 to 4 days and consists of fever, extreme backache and headache, prostration and often vomiting, sore throat and cough. The onset of the eruption may be accompanied by temporary fever. Macules are succeeded by shallow pits which become vesicles in about 3 days. On about the 8th day of eruption pustulation occurs followed by crusting after the 10th day. Lesions are centrifugally distributed and are most dense on the face and distal parts of the extremities. A successful vaccination usually excludes the diagnosis of smallpox in a suspected individual. Infectivity is present from just before the onset until the lesions are healed.

Treatment

- A Specific Measures Hypoimmune vaccine gamma globulin
show promise experimentally
- B General Measures Penicillin has generally favorable effect
probably due to control of secondary bacterial invasion
- C Local Measures
- 1 Mouth membrane Early in the disease provide good oral
hygiene (see p 5) and apply petroleum or mineral oil swab
to the nares
 - 2 Skin Care Cleanse If lesions are confluent and up
stung treat with pyoderma (see p 84) Avoid itching by
use of antipruritics (see p 67) restrict and sedation may
be necessary
- D Treatment of Complications Treat associated secondary
infections otherwise treatment is symptomatic Complications
in the secondary infections of the skin mucous membranes
and respiratory tract septicemia nephritis myelitis and
vascular neurologic manifestation

Prophylaxis

Vaccine (see p 494)

EPIDEMIC PAROTITIS (Mumps) (code No. 621.170)

Mumps is a contagious disease caused by a specific
virus which most commonly involves the salivary glands but it
occasionally produces meningitis encephalitis and
orchitis The organism is almost always favorable Test ul-
traphysically unilateral may follow but rarely produces
sterility

Diagnosis

The incubation period is 2 to 4 weeks (usually 18 to 21 days)
Swelling of the glands the parotid glands the commonest
manifestation and usually accompanied by severe yet minor mani-
festation Headache and drainage of abdominal pain not il-
lusion and swelling usually associated with fever generally
distant meningitis pharynx (confirmed by laboratory report) pan-
creatitis and orchitis typically Complications frequent:
bilateral deafness gonorrhea Mumps is probably not a
justifiable therapeutic of swelling and not swelling disappears

Treatment

- A Specific Measures None available
- B General Measures
- 1 Isolate until swelling subsides
 - 2 Bed rest and fluid intake
 - 3 Aspirin avoid aspirin analgesics if required
 - 4 Alkaline mouth solution mouth washes
 - 5 Mumps vaccine 1 year 20 years old the mumps virus
gamma globulin 25 units IM may reduce the incidence of
infection and death
- C Treatment of Complications Complications are usually
minor manifestation of the disease and the complications
to They may produce death due to complications of parotitis

- 1 Meningoencephalitis (code No 912 170) ☐ be asymptomatic
 - a Analgesics as necessary
 - b Lumbar puncture if necessary ☐ reduce headache
 - c If very severe may treat with hydrocortisone as in o chitis
- 2 Orchitis (code No 755 170)
 - a Suspension of scrotum in suspensory or toweling bridge and application of ice bags
 - b Incision of tunic may be necessary in severe cases
 - c Codeine or morphine as necessary for analgesia
 - d Infection of spermatic cord at external inguinal ring with 10 to 15 cc (2 1/2 to 5 dr) of 1% ☐ local solution
 - e Hydrocortisone 100 mg i.v. followed by 100 mg orally every 6 hours for 2-3 days
- 3 Parotitis (code No 690 170) Symptomatic relief only
Parenteral fluids if necessary
- 4 Oophoritis (code No 788 170) Symptomatic treatment only

Prophylaxis

- A Mumps convalescent serum 20 cc (5 dr) i.m. may reduce incidence in exposed susceptible
- B Mumps virus vaccine may produce temporary active immunity
Intradermal injection of virus antigen denotes immunity if followed by local pythema

POLIOMYELITIS (Infantile Paralysis) (code No 372 171)

Acute anterior poliomyelitis is an infectious highly communicable disease caused by any one of three identified types of neurotropic virus occurring throughout most of the world in epidemic form and especially in the Western world in epidemic form. It occurs with highest frequency in warm seasons. The disease is virtually as prevalent as measles but most infections are inapparent. A few produce fever and headache and back stiffness with mild transient illness. A small number (probably 0.1 to 1 per cent of cases) result in lower motor neuron paralysis usually symmetrical and of great variation among patients. Case fatality rates vary according to attainment of vaccine quality of medical care and degree of immunity and intensity of infection in the area. The gross fatality rate is below 5 per cent in the United States and varies from less than 5 per cent to 30 per cent in severe epidemics most all of which have bulbospinal involvement with respiratory paralysis. Prognosis in severe cases depends largely upon the skill of the physician and the mechanical facilities for respiratory assistance and tracheobronchial toilet.

Diagnosis (For diagnosis of severe cases see p 454)

The incubation period is usually 10 to 14 days (range 3 to perhaps 30 days). The onset of paralytic disease may be preceded by a brief episode of influenza like illness followed by apparent recovery then recurrent fever headache backache stiffness and nausea and vomiting. Nonparalytic poliomyelitis is difficult to diagnose with certainty and is indistinguishable from a variety of

asptic meningitidis In paralytic disease w kness o paralysis may d velop at any tum d ing the febrile phas which ra ely la t long than 7 days Ce brospinal fluid show pleocytosis in all b t about 10 per c t of es Diffe ential count is not signif icant pt th tian n paralyt cas a high total counts w th rel ative lymphocyt i s ggest oth dis e spe ially mump Protein m y be slightly l vated and may inc ease d ring th fi at few d ys of ill as Sugar and chl ride al s a e normal

Viru may be isol ted from th aoph rymx and stool for iable pe lods begnng bef onset of ympt ms (m y be iso lat d a lo g as a ve al w kth after f m stool) Spe fic diagnosis is est blish d nly by i olation of the viral agent and d mstr tion of an incr a ing tite of neut alizing or mplement fixing ant bod s in blood Se ological t ts ar t yet wid ly av ilabl

T tment (E ly Pha) (For see a es ee p 454)

A Sp li Ma Non available

B Gen l Ms

1 Rest a d supp t

- a T vel a tivity and neces y exam n tions and ych t ess hould be a ided
- b P fo m b lef and curs y muscle check not mo e than o c daily in a ut ases Muscl exami at n should not ntail m al r a tivity on the p t of th -pati nt
- c Maintain comfo table but ch gi g po sitions in a p l o bed fl m matt e s foot bo d po g rubbe pads rolls sa db g and light splints

2 Reli e pain nd anxi ty

- a Aspirin o aspi in with amphetamine and phenob ital Avoid op tes and oth ha b tu at
- b T anquili g d ugs s ch mop obam te (Eq anil® Miltown®) and m thylphenidyl cet te hydr hlor d (R talin®) m y pr e ve ful
- c H t wool pa ks (K nay) to ext mut or pecifi areas d ing i i ale pe iod complete body pa ks only wh n afeb ile

3 M cl sp m Chang of po it extremity p ks a d analges dr g usu lly s ffi e Depot fo ms f i bo u ine may b m d b t their effect i not been uff ently eval at d

4 Bow l ont l i hyd ation and int tinal hypo t vity oft lead t imp ction Examn f eq ntly Gl e suff ient fluids Us nemas and neostigmin i M if n e sary

5 Bl dd w aks s M y oc with pa alys lar lvi g y m l gr g mo t ommonly with p pl gia

- a Ins t Foley c th te with g sta ptic are
- b Do ot tiempt i mop ophysiassi with nt ml rob als
- c C nne t Fol y c thete with gra ity bottl by st il lear pla i t be Chang ath te v y fir d y and re mov as n e po sible
- d T eat p ific urin ry inf tion after identif tio of o ganism and determinati n of en itivity to antimicrobial

6 N trition D mg a ly phas and as ling a bedfast as n ut al s h diet giv a maximum f 0.5 Gm alcium co t t daily (o milk or milk product) and maintai fi id in

454 Poliomyelitis

take so as to insure adequate daily output of low specific gravity urine (1520 liters daily for adult). If nasogastric feedings are necessary utilize liquid milk baby foods, juices, low calcium soybean milk substitutes, lactose and vitamins.

Diagnosis (Severe Cases)

Severe poliomyelitis infections threaten life by respiratory muscle weakness, impaired airway, pharyngeal paralysis or involvement of vital centers. Diagnosis is made upon appearance of altered breathing pattern, development of paradoxical respiration, diminution of vital capacity, pooling of pharyngeal secretions, change of voice, impairment of swallowing, diminished cough, fatigue, restlessness, lethargy and confusion in any combination or sequence, often in association with facial, extraocular, lingual or masticatory muscle weakness or upper trunk-shoulder girdle paralysis. Upon the appearance of any of the manifestations of severe involvement the following observations should be made:

- A Record predicted normal vital capacity and determine vital capacity at least daily utilizing spirometer basal metabolism machine or special ventilometer.
- B Note rate of progression. Progressive involvement of muscle groups particularly upper trunk, shoulder and neck with persistent fever usually indicates fulminating course.

Treatment (Severe Cases)

A Specific Measures None available

B General Measures

- 1 Mobilization of personnel and equipment. Symptoms of grave poliomyelitis require emergency mobilization of medical, surgical team and basic equipment, tank respirator preferably with positive pressure attachment, tracheostomy surgical set, intravenous set (with polyethylene catheter and cut down instruments) and aspirating pump.
- 2 Indications for tracheostomy. Impaired airflow from accumulation of secretions, vocal cord paralysis or spasm (cyanosis, deep unconsciousness and convulsions should not be permitted to occur), pharyngeal paralysis (impaired swallowing mechanism, regurgitation of food through the nose aspiration of foodstuffs), rapidly falling vital capacity, high fever and rapid extension of paralysis. If bronchoscopic examination is performed, tracheostomy should be done with bronchoscope in situ.

Artificial respiration is usually necessary during tracheostomy provided by means of oxygen anesthetic bag, hand respirator or clinical respiration pump, e.g. positive pressure devices. NOTE: Early tracheostomy may be lifesaving and may limit extension of disease by preventing hypoxia. Indication must be met. Heavily constipated with less experienced the aseptic teams. With an extremely skillful nursing staff tracheostomy may be avoided. The risk of surgery is negligible in comparison with lifesaving advantages. Use transverse incision at the level of the cricoid with the neck extended. Insert through first tracheal ring below cricoid. Never perform low tracheostomy in poliomyelitis, never incise cricoid.

- 2 Gastric hemorrhage Uncommon, but may cause death. Transfuse if bleeding or perforated Curling's ulcer is suspected. Surgery should be undertaken under positive pressure respiration if perforation is proved.
- 3 Bladder stony and infection See page 453.
- 4 Ileus and impaction See page 453.
- 5 Atelectasis Prevent by aerosolization of air stream, periodic deep breaths by increasing tank pressure briefly or special vacuum attachment, change of position and prevention of respiratory infection as well as good tracheobronchial toilet. If atelectasis occurs treat with positive pressure aerosol, the spy bronchodilators, wetting agents and if necessary trypsin. Bronchoscopy is usually ineffective unless inspissated secretions are present.
- 6 Mental changes Psychosis (usually short lived) with confusion, disorientation and hallucinations or delusions occur in a small percentage of cases. They may be benefited by new drugs especially *Frenquel*[®] (aracyclo ol hydrochloride). Post acute depression is the rule in severe disease. It subsides in 6-8 weeks with supportive psychological care.
- 7 Pregnancy Pregnant women have a high susceptibility to poliomyelitis and often develop the disease. Attentive expectant care until term. If at or near term carry through labor in respirator. Deliver on detached respirator tray under positive pressure respiration with local block or do cesarean section. Mortality is negligible with a well coordinated respiratory and obstetric program. Early in pregnancy spontaneous abortion may occur or surgical abortion may be necessary. Try to avoid procedure until the end of the febrile period.

D Convalescence and Rehabilitation

- 1 Principles Prevent deformity, avoid exercise during febrile period and mobilize early range of motion and position change during febrile period. Early active exercise under skilled direction as soon as feasible.
- 2 Early bracing and splinting for therapeutic purposes in order to activate therapy program. NOTE: The full gamut of physical and occupational therapy, individual and group psychology, social service and application of all medical specialties may be required in the rehabilitation process.

Prophylaxis

A safe and effective killed virus vaccine which is antigenic for all the types of virus is now available and efficiently recommended for people so as through age 45. It can be given to infants at the same time as DPT or pertussis immunization. For children or adults give 1 cc intramuscularly 1 cc after two to four weeks and 1 cc after a year or eight months. A second injection will probably prove to be necessary.

Immune stimulation does not prevent survival of the virus if it is transmitted and outbreaks may still be anticipated in crowded areas. During such outbreaks travel, fatigue and contact with crowds should be minimized.

The incidence of other neurotropic virus infections warrants a regime of rest and close observation for all individuals especially children with symptoms of meningeal irritation.

PSITTACOSIS (Ornithosis) (code No 010 173)

Psittacosis (ornithosis) is characterized by pneumonitis often migratory usually associated with fever to emia. A history of contact with parrot, parakeets, pigeons or rarely other birds is usually obtainable. Diagnosis is proved by isolation of virus from blood or sputum of the patient or by rising titer of complement fixing antibodies. Human to human transfer is rare although isolation precautions are wise.

Treatment consists of giving tetracycline drugs or chloramphenicol 0.5 Gm. every 6 hours orally or 0.5 Gm. I.V. every 12 hours for 10-14 days or penicillin (aqueous) 100,000 units I.M. every 3 hours for 2 weeks. Give oxygen and sedation as required.

ENCEPHALITIS (code No 030 1)

Encephalitis may be athropod born (Eastern and Western equine encephalomyelitis, St. Louis or Japanese B) postinfectious (measles, vaccinia, etc.) or of unknown type (von Economo's et al.). Severe and progressive neurological abnormal little signs of meningeal irritation and convulsions may be noted. Lymphocytes are found in the cerebrospinal fluid unassociated with decreases of sugar or chloride level. Rising titer of complement fixing neutralizing antibodies is confirmatory in the atropod born types and in mumps encephalomyelitis.

Report of multiple punctures may relieve symptoms. Prevention of alytic transmission of diseases, pneumonia and urinary tract infection is important. Give anticonvulsants as needed (pp 351 and 535).

LYMPHOCTIC CHORIOMENINGITIS (code No 010 160)

Lymphocytic choriomeningitis is a viral infection of the central nervous system which is clinically indistinguishable from non-polyomyelitis poliomyelitis or mild encephalitis. The virus may be isolated from the blood or spinal fluid. A diagnosis may be confirmed by rising titer of neutralizing or complement fixing antibodies.

Incubation period is probably 8 to 21 days.

Treatment for encephalitis (see above).

DENGUE (code No 010 162)

Dengue is an infectious disease caused by a virus transmitted by mosquitoes. The incubation period usually 5 to 8 days following the bite of an infected Aedes mosquito. Onset with chill, aching of the back and extremities, prostration. Conjunctival injection and generalized lymphadenopathy may be found. The fever usually lasts 5 to 6 days and may be of the saddle back form. A secondary relapse or multiphasic relapse occurs in the third to fifth day and lasts up to 3 days. Leukopenia is usually marked. Fatality is extremely rare.

Give salicylates as required for discomfort. Permit gradual restoration of activity during prolonged convalescence.

Available prophylactic measures include control of mosquitoes by screening and DDT. Dengue vaccine shows promise experimentally.

RABIES (code No 010 174)

Rabies is an acute viral infection primarily of animals which is occasionally transmitted to man. It is characterized by apathy and hyperexcitability, paralysis, and invariably results in death.

Diagnosis

The incubation period is usually 2 to 8 weeks (occasionally as long as 1 year) following the bite of a rabid animal. Onset occurs with pain and numbness at the site of inoculation followed by depression, irritability, and mild dysphagia. This is followed by hyperesthesia and muscle spasms, particularly of the pharynx. Eventually paralysis and death occur.

Treatment

Treatment consists of absolute quiet and freedom from stimulation and sedation as in tetanus to prevent convulsions. No specific measures are available.

Prophylaxis

- Observation of animal producing bite.
- Cauterization of wound with fuming nitric acid followed by neutralization of the acid with lime water or thorough washing with green soap.
- Rabies vaccine 2 cc subcutaneously for 14 days following positive diagnosis of rabies or following bite by a suspected animal if animal cannot be observed or followed on the head.
- Human hyperimmune serum should be administered in addition to vaccine in fatal or severe hand bites.

YELLOW FEVER (code No 010 178)

Yellow fever is a viral infection of man and monkeys due to a virus transmitted by Aedes mosquitoes. It is characterized by fever, relative bradycardia, and hemorrhagic phenomena. The mortality rate of yellow fever is quite variable including missed cases it is probably 5 percent.

The incubation period is 3 to 8 days. The onset is with chills, headache, and backache. The fever often subsides temporarily after 3 days during which time the patient is flaccid, toxic, and may have severe nausea and vomiting. The conjunctiva are injected and the tongue red. This is followed by pallor, chills, bleeding gums, black vomit, slight jaundice, melena, albuminuria, and prostration. Leukopenia and relative bradycardia are usually seen.

Treatment consists of giving a liquid diet, limiting food to high carbohydrate, high protein liquids as tolerated, intravenous glucose and saline as required, analgesics and sedatives as required, and saline enemas for constipation.

Available prophylactic measures in mosquito control by adequate screening DDT etc. Vectors available. Give 0.5 cc b.c.u.

INFLUENZA (code No 010 168)

Influenza is a viral infection of the respiratory tract characterized by abrupt onset of systemic and respiratory symptoms. The antigenic strains of influenza virus exist (A, B, C). Most preventable due to A strains.

In treatment bed rest and complications the most important consideration. Analgesics and antipyretics may be used. Antibiotics are of value especially in prophylactically and should be reserved for treatment of bacterial complications such as pneumonia.

Polyvalent influenza vaccine is available for temporary protection. One should be given but highly before onset of influenza epidemic preferably during the season.

DISEASES DUE TO RICKETTSIAE

The rickettsia is an arthropod born organism which produces widespread epidemics of thrombotic and circulatory failure in the small blood vessels and plaques. The variety of involvement varies with the different species of the rickettsia. The symptoms of the principal epidemic typhus, Rocky Mountain spotted fever and Brill-Zinsser disease are generally similar to the advantage of specific treatment.

D. gnosis

A. Typhus Fev. (code No 010 184) Incubation period 5 to 15 days. Typhus is caused by Rickettsia prowazekii (pneumonia type) or Rickettsia mooseri (murine type). The former transmitted by body louse the latter by rat flea. The disease is similar except that the mortality is less. Onset abrupt with high fever, aching and prostration. Delirium, toxicomania, myoclonus. A macular maculopapular hemorrhagic rash begins on the fourth to seventh day. Prothrombin time is normal and specific to the xanthine usually appearing on the palm and sole. Leukopenia only. Diagnosis may be confirmed by complement fixation or Pfeiffer OX 19 agglutination appearing during the disease.

Rocky Mountain Spotted Fever (code No 010 181) The incubation period 3 to 14 days. Rocky Mountain spotted fever is caused by Rickettsia akari and transmitted by tick bite (pneumonia type) and murine and D. variabilis. Prodromal symptoms of malaise, no pain and malaise only. The onset of high fever, headache, photophobia, pain in the muscles usually aches. Arthralgia and myalgia. Hemorrhagic maculopapular rash appears on the wrist and ankles in the second to sixth days and extends peripherally to the body including the face, palm and

soles. Leukopenia is usually present early. Complement fixing antibodies and agglutinins for Proteus OX 2 or OX 19 appear during the second week.

- C Scrub Typhus (Tsumu g mushi Fever) (code No 010-183) The incubation period is 6 to 16 days. Scrub typhus is caused by *Rickettsia orientalis* (*R. tsugamushi*) and is transmitted by larval mites. An eschar at the area of inoculation is common. The onset is sudden with chills, fever, malaise and cough. A dull red maculopapular eruption appears on the trunk from the fifth to eighth days and may extend to the extremities. Specific complement fixing antibodies or Proteus OX K agglutinins appear during the second week.

- D Q Fever (code No 010-185) The incubation period is 14 to 26 days. Q fever is caused by *Coxiella burnetii* and is apparently acquired from sheep, goats and cattle in a manner not yet determined. Headache, fever, cough and stiff neck are common symptoms. Rusted rigors may occur. Pneumonitis or hepatitis may be demonstrated. Specific complement fixing antibodies appear during the second or third weeks.

- E Rickettsialpox (code No 010-187) *Rickettsialpox* is an infection caused by *Rickettsia akari* introduced by the bite of a mite. A lesion which passes through the stage of papule, vesicle and eschar precedes the onset of fever, chills, headache, photophobia and muscular aches by about a week. A generalized rash which evolves through papular, vesicular and crusting stages appears at the onset of fever or a few days later. Leukopenia is usually present.

Treatment

A Specific Measures

1. Tetracycline 0.5 to 1.0 Gm orally every 6 hours for 3 to 7 days or 0.5 Gm i.v. every 12 hours.
- or 2. Chloramphenicol USP (Chloromycetin®) 0.5 Gm orally every 6 hours for 2 to 7 days.

B General Measures

1. Parenteral fluids, oxygen and sedation as required.
2. Other supportive measures as needed.
3. Decontaminating procedures must be carried out for louse borne infections (see p. 92).

Prophylaxis

A Specific Measures

1. Typhus (Cox type) 1 cc subcutaneous at 7 to 10 day intervals.
2. Rocky Mountain spotted fever vaccine 1.0 cc about 3 times at 5 to 7 day intervals.

- B General Measures Decontaminating is very important in louse borne epidemic typhus (see p. 92).

DISEASES DUE TO BACTERIA

SCARLET FEVER (code No 010 102) and
STREPTOCOCCIC SORE THROAT (code No 631 102)

■ rlt fever nd streptococ i so e th oat (foli ula t nsul
l tis a ptic e throat) a inf cti ns of the fa es by β h mo
lyu at eptoco i (Lan ef ld Gro p A) In ca l t fev In add
t n m rt in m nif station d to r yth og nic tox n a β s nt
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The m tality te fr m st ptoco ic s e throat nd s c l t
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b bly mo e common than g r lly pp ted a d m y be appar
s t only when s rial el troc diagrams e tak n during conva
les e

Diagnosis

The incubat on p od is 2 to 7 days Th ons t is usually
ab pt w th chills f ver he da he pain in th ext m t s o bdo
men v miting and so th oat The throat is u ally f ry r d
and mode t ly ed m to s Exudat d pres t consi ts f pat hes
of whit sh mat il which m y b e s ly wiped off The rash of
s arl t fev consi ts of a punctate r ythem whi h i d n eat i
th skin fold of th axilla and gr in but does not ppe r on the ex
ten o su f ce of th upp extremity St awberry tongu and
stippling of the soft palate m y b not d Diagno is may be con
f med by cult re Sed me tatio tel in r s d a d leuk cyto sis
i p nt

The d t on of the infection varies it m y b p olo g d by a
onv l ent rri state

TreatmentA Sp if M s es

- 1 P n i lin p oc e 300 000 units d ily i M P n i lin n
m i b co tin d 5 t 7 days lap m y o cu Oral
pen il 200 000 u t ev y 6 ho s Ben than P
c llin G U S P (B cillin[®]) 1 100 000 u t i l M m y
ll ed Loc ip illin by los ges w th l s a
- o 2 Tetr cy lin dr gs 0 25 0 5 Gm very 6 hou s or
eryth my in 0 2 0 5 Gm v y 6 h ur ll ffe tve but
m y be f llowed by bact iol gi al o clinical r laps
- 3 S Monamide hav n eff ct on th cours of t ptoco ic
so e th oat o r l t f v r b t may p vent complic tion
if giv n f 2 weeks Do ge 0 5 Gm (7 1/2 gr) v y 4
ho with q l or d ble quantities of sod um bi rb nate
- 4 S let F r St ptococ s Antit x n (3 000 IU 000 unit)
may be giv n i M with b f t in ve ly tox s e of
a let f v r
- 5 Convales ent e u n 25 t 150 c (1 5 oz) may be u ed
simila ly to tilosin nd m y be given i V

B G l M es

- 1 Bed re t until af bril nd s d m n tati n rat is n rmal
- 2 Du t uited to of th o t
- 3 Hot salin = 30% gl o ga gl or th oat ir igation 3 o

4 times daily for relief of sore throat

4 Aspirin or codeine as necessary for symptomatic relief

E Treatment of Complications

1 Complications due to infection include cervic adenitis, rhinitis, otitis, otitis, mastoiditis, pneumonia, empyema, septic arthritis and septicemia. Treatment with penicillin is usually effective (see p 502).

2 Complications of unknown etiology

a Rheumatic fever may be prevented by early vigorous treatment of the infection with penicillin (see p 518).

b Acute hemorrhagic glomerulonephritis (see p 293).

F Treatment of Carriers 300 000 units of penicillin procaine complex daily I M for 10 days or benzathine penicillin G

1 200 000 units I M usually abolishes the carrier state

Prophylaxis

A Scalet fever toxin in 5 weekly injections of 500 2000 8000 25 000 and 80 000 units as best prevents the toxic manifestations of scalet fever but does not prevent streptococcal infection.

B S Monamides 0.5 Gm (7 1/2 gr) bid penicillin 100 000 units by mouth bid or benzathine penicillin 600 000 units I M once a month red eth in indication of streptococcal infection. These should be reserved for individuals with rheumatic lesions to prevent recurrence of the mitral fever.

DIPHTHERIA (Pharyngeal code No 631 125)

(Laryngeal code No 330 125)

(Nasopharyngeal code No 318 125)

Diphtheria is an acute infectious disease caused by *Corynebacterium diphtheriae* and characterized by the formation of a pseudomembrane at the portal of entry usually the respiratory tract and by the activity of exotoxin at distant sites.

The mortality rate of diphtheria generally varies between 10 and 20 percent. Old individuals do poorly and delay of treatment carries with it a high mortality rate. Myocarditis appears early is frequently fatal and disturbances of conduction or the appearance of rapid arrhythmias imply lethally prognosis. However if the patient survives recovery is usually complete. Neuritis is rarely fatal unless permanent complication paralysis of cranial nerves or necrotic costal muscle is established. Surviving patients recover slowly but completely.

Diagnosis

The incubation period is 2 to 7 days. Symptoms develop at the site of the lesion but include sore throat, nasal discharge, hoarseness accompanied by malaise and low grade fever. The pseudomembrane is typically grayish homogeneous and dense. Edema and a narrow zone of erythema around the lesion usually found. Diagnosis is confirmed by it. If clinical assumption is made as long as *C. diphtheriae* present in the nasopharynx the carrier state is not uncommon.

TreatmentAntisera

- 1 Diphtheria antitoxin must be given in all cases where diphtheria cannot be excluded by simple clinical examination. The intravenous route is preferable in all except the mild cases in those who are unfit to tolerate subcutaneous. Conjugation and kinetic test for serum sensitivity (see p 495) should be done in all cases and desensitization (see p 495) carried out if necessary. The dose varies with the duration of the disease, the location of the lesion and the age of the patient. A single dose should suffice.

Diphtheria Antitoxin Dosage Schedule

Location	Child	Adult
Anterior nasal	5000 units	10,000 units
Mild pharyngeal	10,000 units	20,000 units
Mild to pharyngeal	20,000 units	40,000 units
Severe pharyngeal and nasopharyngeal	40,000 units	80,000 units
Laryngeal	10,000 units	20,000 units
Any two sites	40,000 units	80,000 units
Late case		

- 2 Penicillin procaine 300,000 units daily or penicillin 100,000 units every 3 hours. If reaction slightly the dose should be reduced. Penicillin is given in the treatment of diphtheria again. The dose of dry procaine penicillin is 100,000 units daily. The dose of the diphtheria is 100,000 units.

General Measures

- 1 Absolute bed rest for at least 3 weeks and until ECG is normal.
 2 Liquid diet as tolerated.
 3 Hot saline or 30% glycerine throat irrigation 3 or 4 times daily.
 4 Aspirin or codeine as required for pain.

Treatment of Complications

- 1 Myocarditis (code No 430 125 9). This may occur at any time post several weeks after onset and may be associated with peripheral vascular collapse. Anginal or abdominal pain may be associated with vomiting or syncope may be noted. Detection of the mitral regurgitation is also noted in blood pressure, gallop rhythm or arrhythmia may be found. ECG evidence is usually demonstrated in several records.
 a No definitive treatment known.
 b Oxygen by tent or mask may be needed.
 c Hypotension glaucoma is treated with 100% of 20% solution daily may aid.
 d Digitalis should be reserved for paroxysmal tachycardia.
 2 Nausea (code No 98 125 9) generally does not begin until after 3 weeks after the onset. Nausea is a severe symptom of fluid through the nose (NIX) paralysis of accommodation (NIII) dysphagia and dysphonia (NX) and rarely involves involvement of other cranial nerves usually preceded by involvement of

the e t emities which is associated with paresthesias weakness and depression of reflexes. Nasal feeding should be attempted in such cases. Corrective splinting and physical therapy may be of aid.

3 Respiratory tract obstruction. Croupy cough, stridor and dyspnea, great laryngeal obstruction.

- a Suction of membrane and secretions under direct laryngoscopy may help.
- b Intubation or tracheotomy should be performed before the appearance of cyanosis if the distress increases.

D Treatment of Carrier. Penicillin has very limited effect on the carrier state.

Prophylaxis

A Children. Three injections (0.5, 1.0 and 1.0 cc) of diphtheria toxoid (formol alum or aluminum hydroxide precipitated) at one month intervals during the second 6 months of life (may be combined with tetanus toxoid and pertussis vaccines). Follow by Schick test at 3 to 6 months. Give 1.0 cc booster at 2 years and at start of school.

B Adults

- 1 Sensitivity test. Moloney's test for sensitivity to toxoid. 0.1 cc of 1:20 dilution of plain toxoid intradermally. Read like Schick test at 24 to 48 hours.
- 2 If Moloney test is negative proceed as in children.
- 3 If Moloney test is positive give 0.1 cc of 1:10 dilution of formol toxoid intramuscularly at 3 week intervals for 3 doses.

PERTUSSIS (Whooping Cough) (code No. 350.108)

Pertussis is an acute communicable infection of the respiratory tract. It is caused by *Bordetella pertussis* a definite characterized by paroxysmal cough, whoop, and leukocytosis. Until recently the mortality rate of pertussis in infants under one year of age with disease is most common was 20 per cent. This has been materially reduced with modern antibacterial therapy. Older children rarely die of pertussis.

Diagnosis

The incubation period is 7 to 14 days. The onset is with coryza followed by gradually increasing cough. After 1 to 2 weeks the cough becomes paroxysmal especially at night and is often followed by vomiting. Whoops may be heard during the paroxysm but are often absent or infrequent in young infants. Absolutes leukocytosis appears during the paroxysmal stage. The diagnosis may be confirmed by cough plate, nasopharyngeal swab cultured on Bordet-Gengou's medium. Infectiousness greatest early in the disease and decreases until the organisms disappear from the nasopharynx after about one month.

Treatment

A Specific Measures

- 1 Antibiotic

- a Tetracycline 25-50 mg/Kg (11 mg/lb) per day orally
- or b Streptomycin 1.0 Gm per day in divided doses I.M. for one week may be effective
- c Chloramphenicol USP (Chloromycin®) 50 mg/Kg (23 mg/lb) per day orally
- d Polymyxin 30 mg/Kg (13 mg/lb) per day I.M. also promising but this drug may be toxic (see p. 510)
- or e Erythromycin 30 mg/Kg/day orally
- 2 Hypersensitive serum hyp immune serum globulin appears to hasten recovery prevent complications and reduce mortality 20 hyp immune serum or 2.5 cc hyper immune gamma globulin given daily or every other day I.M. for 4 or 5 doses

B. General Management

1. Nutrition

- Frequency of feeding may be necessary
- b Refeed if vomiting occurs shortly after meal
- High caloric formula by gavage tube may be required in infants who refuse to eat
- d Parenteral fluids may be resorted to in case of inadequate fluid intake as well as uses

2. Cough

- a Sedative and expectorant cough mixture of only light benefit
- b Atropine titrated to the point of dilating by increasing doses of 1/100th of belladonna every 4 hours starting with 0.05 cc of a 1% solution
- Ethel nebulizer treatment by nebulizer

3. Treatment of Complications

- 1 Cerebral hemorrhage intracranial and umbilical hernia may occur due to the increased pressure caused by the cough. Treat symptomatically
- 2 Pneumonia usually develops secondary invade should be treated by hyperimmune serum gamma globulin (see above) penicillin and sulfonamides or tracheostomy in Oxygen is often required
- 3 Convulsions may be due to a toxemia, petechial hemorrhage, the brain substance, encephalitis or cerebral hemorrhage. If convulsion recedes after 100% oxygen inhalation and lumbar puncture may be of aid
- 4 Otitis media should be treated with penicillin or sulfonamides. Myringotomy may be necessary

Pertussis

- A Passive prophylaxis of exposed infants may usually be accomplished by the injection of 20 cc of hyperimmune serum 2.5 cc of hyperimmune gamma globulin I.M.

- B Active immunity may be produced by the subcutaneous injection of a vaccine containing 10 billion organisms per cc. The initial dose consists of 1 cc and this is followed at 2 to 4 weeks intervals by the second and third doses of 2 cc each. Vaccine containing 30 billion organisms per cc is also used. Follow the manufacturer's instructions on the package. Immunity to pertussis develops after the third dose and is probably sufficient to protect for months of

1 cc are given at 2 years and when starting school. The vaccine may be combined with diphtheria and tetanus toxoid. Encephalitis occasionally follows pertussis immunization.

MENINGITIS

MENINGOCOCCIC (Epidemic) MENINGITIS (code No 910 104)

Epidemic meningitis caused by *Neisseria meningitidis* follows a bacteremia from a nasopharyngeal focus localizing in the meninges. Bacteremia acute or chronic may occur without meningitis. The overall mortality of epidemic meningitis is 10 per cent. Young healthy individuals and those who receive convalescent serum usually survive.

Diagnosis

The incubation period is 3 to 7 days. Fever, chills, headache, pain in the back, abdomen and extremities and nausea and vomiting may be present. Delirium, stupor or coma appear in severe cases. A petechial rash is commonly seen. The neck is stiff and Kernig's and Brudzinski's signs are positive.

Lumbar puncture reveals a cloudy spinal fluid under increased pressure usually containing more than 1000 cells per cu mm with polymorphonuclears predominating. The spinal fluid glucose and chloride contents are decreased and the protein increased. The organism is usually demonstrable by smear or culture.

Infectivity may be present for a few days before the appearance of meningeal invasion but is quickly terminated by therapy. Case to case spread is uncommon. Healthy nasopharyngeal carriers are the common source of spread.

Treatment

A Specific Measures

1 Sulfonamides. The agent of choice

- In severe cases Sodium sulfadiazine or sodium sulfamerazine or a mixture of equal parts of each or sulfisoxazole. Give 3.0 Gm (75 gr) in 1000 cc (2 pts) of an electrolyte solution preferably Ringer's lactate solution I.V. or subcut by electrolyte solution.
- Mild cases Sulfadiazine, sulfamerazine or a mixture of equal parts of each or sulfisoxazole. Give 3.0 Gm (45 gr) orally with equal or double amount of sodium bicarbonate.
- Follow with 3.0 Gm (45 gr) I.V. or subcut every 8 to 12 hours or 1.0 Gm (15 gr) orally every 4 to 6 hours as indicated by severity. Give equal or double doses of sodium bicarbonate orally with the sulfonamide.

and 2 Penicillin

- Aqueous penicillin 100,000 unit I.M. every 3 hours
- Penicillin procaine 600,000 units I.M. twice daily

3 Antibacterial therapy need only be continued on week.

B General Measures

- Bedrest with paraldehyde, sodium amytal I.V. or morphine sulfate as necessary for restlessness.

- 2 Restr nts if n cessary f r mark d r stlessness
- 3 Flid intak should be at least 3000 cc (6 pts) daily and should be sufficient to maintain a u inary output of at least 1000 to 1500 cc (2 3 pt) R pla e fluid l by vomit ng and give par nt rally as needed
- 4 Feedings (and medi tion) by st mach tube if comatos more than 3 days
- 5 Lumbar pon ture to be rep ated if evid nc of incre sed intra cranial p ssure pers ts or to be k respo s to therapy by cer br spinal fluid gluc level
- SHOCK Treat for shock (e p 27) and for a ute adr nat insuff i ncy (e p 382)
- C Complic tio and T atm t Myo arditis and r n i failur are c mmon in eve as u do sp if tr atm nt s available Cran al nerv lesion (especi lly N VIII) are u ally permanent Arthrits requies no treatment other than parac lesis for pain

P ophylaxis

A tot l of 1 0 2 0 Gm (15 30 gr) sulfadiazine ally to ex pos d p ns or ca r ers in two doses taken the e me day

PNEUMOCOCCIC MENINGITIS (code No 910 101)
STREPTOCOCCIC MENINGITIS (code No 910 102)
STAPHYLOCOCCIC MENINGITIS (code No 910 105)

Symptoms are simila t th s of meningococci meningitis b t a p eding inf t on u s ally prese t and a focu t often d m nat ble n the lungs (pn um oc i) th middl ear o sinus ■ Th spin l fluid must be ulta d and examin d to determin the usativ gent

T atm nt

A Sp l M ssure

- 1 T st as m ningo o c c m n gnt s (bo e) and also give 10 000 unit of peni illin in 10 physiologi al salin nt th ally n e daily until CSF glu os normal
- o 2 Aquous peni illin 1 000 000 unit 1 M e ry 2 hours
- 3 Erythromy in 0 5 Gm eve y 6 hours for st phylo oc i m na giti
- 4 T trac y line d ugs m y also be ff live do not combin w th peni illin
- Gen l M ssure Symptomatic and upportive

HEMOPHILUS INFLUENZAE MENINGITIS (code No 910 110)

The form of meningiti may d m lop gradually s ddenly It usally oc u s in infant l s than 2 y old Th symptoms are smila to th of any pu ul m m ingiti (e p 466)

T atm t

A Spe if M ssure

- 1 Dihyd o t pl ny in (adults 1 0 Gm hild n 250 mg) 1 M e ry 6 h rs for one w k nd streptomycin 25 mg in 10 e phy i logi al ll ol t on ntruch cally daily

468 Typhoid Fever

- until cerebrospinal fluid glucose content is normal
- 2 Severe cases should also be given a fadiazine sulfamerazine or a mixture of equal parts of each 150 mg /Kg body wt (65 mg or 1 gr /lb) per day Give equal or double doses of sodium bicarbonate
 - 3 Hemophilus influenzae antiserum (Type B) should also be given to patients with delayed response 100 mg of antibody nitrogen daily I V until serum produces quelling reaction
 - 4 Tetracycline drugs 0.5 Gm every 6 hours are of value Chloramphenicol (Chloromycetin®) is also effective
- B General Measures** Treat symptoms as they arise and maintain good nutrition and adequate fluids

TUBERCULOUS MENINGITIS

(Leptomeningitis code No 912.123)
(Pachymeningitis code No 911.123)

This disease is caused by spread of the tubercle bacilli from a focus usually in the lungs or in the peritracheal peribronchial or mesenteric lymph node There is usually a gradual onset of symptoms with listlessness irritability anorexia and fever followed by headache vomiting night cries convulsions and rigidity of the neck opisthotonos paralysis and coma

Cerebrospinal fluid frequently xanthochromic it under increased pressure and on standing may form a web and pellicle from which organisms may be demonstrated by smear culture or guinea pig inoculation Cells and protein increased but sugar and chlorid are decreased

Treatment

A Specific Measures

- 1 Streptomycin dihydrostreptomycin 30 mg /Kg body wt of each per day 10 in divided doses every 8 to 12 hours for 5 months Streptomycin 2 mg /Kg body wt intrathecally daily for 2 weeks every other day for 2 weeks and twice a week for 2 weeks (intrathecal therapy probably unnecessary if isoniazid used)
- and 2 Isoniazid (INH) 10 mg /Kg body wt per day divided into 2 or 4 doses for one year
- or 3 Aminosilylic acid (PAS) 3 to 5 Gm every 6 hours by mouth or sodium paraaminosalicylate 15 to 30 Gm daily I V for one year

B General Measures Treat symptoms as they arise and maintain good nutrition and adequate fluids

TYPHOID FEVER (code No 010.115)

Typhoid fever is an infection caused by *Eberthella typhosa* and characterized by bacteremia ulceration of the lymphoid tissue of the small intestine and generally toxemia The mortality of typhoid fever varies from 5 to 25% Elderly individuals do poorly

Diagnosis

Incubation period is 5 to 14 days. A gradual onset of fever and malaise often associated with cough or epistaxis is followed by a period of 2 or more weeks of sustained fever and then gradual defervescence. Rose spots, splenomegaly, relative bradycardia, dull pale and pea soup stool may be noted. Leukopenia is the rule. Isolation of the organism from the blood, stool, or urine or a high or rising titer of agglutinin confirms the diagnosis.

Infectivity begins with the appearance of *E. typhi* in the stool or urine and continues until the organism disappears from the excretions which occur 1 to 4 weeks later. Carriers can be a serious public health problem.

TreatmentA. Supportive Measures

1. Chloromphenicol USP (Chlormoxylin®) 1.0 Gm every 4 hours by mouth until afebrile and then 0.5 Gm every 6 hours (Children 50 mg/Kg body wt/day followed by 25 mg/Kg/day when able to take it). Continue treatment for 3 weeks.
2. Hydration 3000 mg every 6 hours may be used temporarily in severely toxic patients.

B. General Measures

1. Prevention of dehydration by careful bathing, skin massage, and use of rubbered gloves over perineal area.
2. Careful hygiene.
3. Inadequate food intake is important.
 - a. High caloric liquid diet (approximately 3600-4800 Cal/day) (See diet pp 55-57). Compliance with supplemental must be secured.
 - b. Caloric diet. About 1500 Cal/1000 cc (1430/qt)

Lactose	400 Gm	8 oz
Corn	800 cc	12 z
Milk	2800 cc	8 pts
 - c. Casein hydrolysate formula about 1950 Cal/1000 cc (1810/qt)

Casein hydrolysate	125 Gm	4 z
Milk	1800 cc	2 pts

4. Adequate fluids. Paracetamol glucose solution may be used as a vehicle for fluid intake and maintenance of input.
5. Distension may be relieved by gentle colonic flexes and abdominal massage. Pilocarpine and castor oil may be used with great caution because of danger of perforation.
6. Diarrhea may be controlled by tincture of opium, bicarbonate, or camphorated tincture of opium (see p 259).
7. The patient must be strictly isolated and his excreta sterilized until negative stool cultures have been obtained.

C. Treatment of Complications

1. Pneumonia (or otitis) may be treated with penicillin, sulfamid, streptomycin, or tetracycline drugs depending on the etiological agent (see p 514).
2. Hemorrhage is usually manifested by increase in pulse and drop in blood pressure associated with the appearance of gross blood in the stool. Transfusion should be used as required.

3 Perforation is often accompanied by abdominal pain, shock and signs of peritoneal irritation. Immediate surgery is required, anticipate and treat shock (see § 27) before it is manifest.

D Treatment of Carriers Chemotherapy is usually ineffective in abolishing the carrier state.

Prophylaxis

A Typhoid vaccine (1 billion organisms per cc) 0.5 cc, 1 cc and 1 cc at weekly intervals by subcut injection. This is usually given with paratyphoid A and B vaccine. Intradermal injection of 0.1 cc at weekly intervals may be used to minimize unfavorable reactions.

B Drinking water and milk must be boiled during an epidemic.

C Carriers must be rigidly controlled and not permitted to be food handlers.

PARATYPHOID FEVER (code No 010 114)

This disease may be caused by either *Salmonella paratyphi* (paratyphoid A) or *Salmonella schottmulleri* (paratyphoid B) and is clinically similar to typhoid fever. Paratyphoid fever however is usually more abrupt in its onset and usually is a milder disease than typhoid. The differential antibiotic sensitivity infections can only be made by serological examination.

Treatment and prophylaxis are as for paratyphoid fever.

BRUCELLOSIS (Undulant Fever)

Bruceella is a acute or chronic systemic infection caused by *Brucella melitensis* (code No 010 1171), *Brucella abortus* (code No 010 1172) or *Brucella suis* (code No 010 1173) and is usually acquired by the ingestion of infected dairy products or by contact with infected material.

Death is not common in brucellosis but may occur from prolonged debility or subacute bacterial endocarditis. The acute stage may terminate spontaneously or may become chronic. The chronic form may persist for many years.

Diagnosis

A history of ingestion of raw milk or butchering of infected animals is helpful. Human to human spread does not occur. Fever may be a periodic undulating low grade or absent for long periods. Systemic symptoms include malaise, arthritis, depression and sweats. Splenomegaly may be present. Leukopenia is the rule. Positive blood culture is diagnostic. High or rising titers of agglutinating complement fixing antibodies in the presence of a compatible clinical picture allow diagnosis. Skin test and opsonic cytophagic index are unreliable evidence of active infection and the former may induce confusing body responses.

Treatment

A Specific Treatment: The use of tetracycline drugs, chloramphenicol (Chloromycetin®) and streptomycin.

sulfadiazine therapy is not but entirely established in chronic bullous

- 1 Combination of tetracycline 2.0 Gm daily and tetracycline drugs 2.0 Gm daily is probably the treatment of choice
- or 2 Tetracycline drug orally Give 50 mg on the first day 50 mg twice the second day 50 mg 3 times the third day add 0.5 to 1.0 Gm every 8 hours for the following 12 to 14 days Small initial dosage avoids Herxheimer like reaction
- or 3 Chloramphenicol USP (Chloromycetin®) 60 mg /Kg body wt (27 mg /lb) orally initially then 0.25 Gm every 3 hours until fever subsides
- 4 Dihydrostreptomycin 0.5 Gm I.M. every 6 hours for 2 weeks and sulfadiazine 1 Gm (15 g) initially and 1.0 Gm (15 g) every 6 hours for 2 to 3 weeks

B General Measures

- 1 Bed rest in a sterile stage
- 2 High vitamin intake

Prophylaxis

- A Destruction of infected dry animals and immunization of susceptible animals
- B Pasteurization of all milk and milk products

GAS GANGRENE (code No 12)

Gas gangrene is a very severe and often fatal disease caused by a localized infection of wounds which are soiled with dirt or feces. The infection of tissue is usually present. Fever, chills, and local swelling are usually seen. Gas bubbles in the tissue may be demonstrated by x-rays. Bacteria may be present. An abscess of discharge from the wound should confirm the diagnosis.

Treatment

- A Specific Measures
 - 1 Penicillin 100,000 units I.M. every 3 hours
 - and 2 Polyvalent gas gangrene antitoxin 20,000 units at once and repeat every 8 to 12 hours
 - and 3 Full doses of sulfadiazine sulfamethoxazole mixture (see p 499)
- B Supportive Measures
 - 1 Adequate analgesic and sedative and appropriate fluid intake

TETANUS (code No 010 11x)

Tetanus is a nervous system intoxication caused by fixation of Clostridium tetani toxin which enters through an open wound and infection is fatal. The disease is characterized by tetanic contractions of striated muscle.

Diagnosis

period is 5 days to 5 weeks. The first symptom

toms usually are pain and tingling at the site of inoculation which may be an insignificant wound that has become contaminated with soil. This is followed by irritability, trismus, stiff neck and extremities, and spasm of the abdominal muscles. Rigidity of muscles, risus sardonicus, stiff neck, rigid abdominal muscles and hyperactive reflexes are found. Tonic convulsions gradually appear and are precipitated by slight stimulation. Fever is variable. Death usually occurs from asphyxia or pneumonia. The mortality rate of tetanus is approximately 40%. A long incubation period and the delayed appearance of tetanic convulsions are favorable signs.

Treatment

- A Specific Measures Tetanus antitoxin 60 000 units I V
- B General Measures
 - 1 Absolute quiet with minimum stimulation
 - 2 Anti convulsant drugs
 - a Thiobromothol U S P 15 to 25 mg /Kg body wt (1/8 to 1/6 gr /lb) rectally every 1 to 4 hours as required to prevent convulsions
 - or b Sodium Amytal® 5 mg /Kg of body wt (1/32 gr /lb) I M as required
 - or c Paraldehyde 4 to 8 cc orally or 10 to 40 cc rectally p r n
 - 3 Curare in oil and beeswax shows experimental promise but is not yet established
 - 4 Mephensin (Tolserol®) 1 to 3 Gm orally or 1 to 2 Gm I V (2 to 5% solution) may be combined with barbiturates
 - 5 Intravenous fluids as required

Prophylaxis

- A Tetanus toxoid 1 cc in 3 doses at 3 to 4 week intervals followed by booster of 1 cc at one year and 1 cc at time of injury
- B Tetanus antitoxin 6000 units I M in individuals having soil contaminated wounds especially puncture wounds compound fractures and powder burns. A good inadequate dose
- C Adequate debridement of wounds

BOTULISM (code No 010 120)

Botulism is a food poisoning caused by the ingestion of the formed toxin of *Clostridium botulinum* and characterized by involvement of the central nervous system especially the bulbar region. The mortality of botulism is 60 per cent depending on the time of onset to 10 days.

Diagnosis

Symptoms appear 18 to 36 hours after the ingestion of improperly sterilized foodstuffs usually home canned. Weakness, vertigo, ptosis, strabismus, dysphagia and dysphonia are usually noted. Gastrointestinal symptoms are generally slight or absent and fever is not prominent. Usually several members of a family are involved. Death occurs from respiratory failure or pneumonia.

Treatment

A Specific Measures Botulinus antitoxin Types A and B
 50 000-50 000 units of M as soon as possible

B General Measures

- 1 Absolute rest with foot of bed elevated to promote drainage from respiratory tract
- 2 Aspiration of respiratory tract frequently
- 3 Oxygen by mask or through tubes indicated
- 4 Respirator as required for respiratory paralysis
- 5 Intracerebral or intraspinal therapy
- 6 Treat complicated pneumonia with antibiotics if present

Prophylaxis

- A Adequate sterilization of all canned foods
- B Eliminating from mixed foods before for 3-10 minutes
- C Disinfection or destruction of all cans with bled lids or jars with leaking lids

TULAREMIA (code No 010 107)

Tularemia is an infection produced by the gram-negative organism Pasteurella tularensis which is acquired by contact with infected animals or by bite of a tick (deer fly, etc.). Local ulceration and regional lymphadenitis or septicaemia may be present. Diagnosis may be confirmed by isolation of the organism (difficult) by high agglutinating titer or by skin test. The incubation period is 2 to 7 days.

Treatment in addition to giving symptomatic and supportive measures consists of giving one of the following: (1) tetracycline 0.5 Gm. every 6 hours orally for 3-10 days; (2) streptomycin 2.0 Gm. i.m. daily in divided doses every 6 hours for 3-10 days; (3) chloramphenicol (Chloromycin®) 0.5 Gm. orally every 6 hours for 3-10 days.

PLAGUE (code No 010 106)

Plague is caused by Pasteurella pestis as characterized by a painful bubo with surrounding edema and severe constitutional symptoms. The plague (code No 361 106) resembles other pneumonias. The diagnosis is stipulation of the organism from lymph node fluid, sputum or blood.

Treatment consists of giving dihydrostreptomycin 2.5 Gm. daily i.m. in divided doses or tetracycline 0.5 Gm. every 6 hours and all drugs in full dose (see 499). Give symptomatic and supportive measures as needed.

Prophylactic measures consist of giving plague vaccine (2 billion organisms per cc) 0.5 ml i.c. at intervals of 7-10 days. The patient should have gamma globulin fully diluted.

CHOLERA (code No 010 129)

Cholera is an acute dysenteric disease caused by infection of *Vibrio cholerae*. After a short incubation period of 1 to 4 days a period of profound diarrhea ensues usually accompanied by severe dehydration, electrolyte deprivation and shock. Abrupt onset and prostration are the most important clinical features. The organism may be isolated from stools or vomit. Spread is principally by contaminated water or food.

Treatment.

A Specific Measures

- 1 Streptomycin 1.0 Gm. every 6 hours I.M.
- or 2 Sodium sulfadiazine 5.0 Gm. (75 g.) in physiological saline solution I.V. followed by 3.0 Gm. (45 gr.) I.V. every 8 to 10 hours. Oral sulfadiazine may be substituted when vomiting ceases.
- 3 Sodium bicarbonate in equal or double doses should be given with the sulfadiazine when the patient is able to swallow.

B Supportive and Symptomatic Measures

- 1 Human plasma and physiological saline or Ringer's solution I.V. until shock, dehydration and anuria are alleviated. Large amounts may be required.
- 2 1/6 molar lactate solution may be necessary in severe cases to combat acidosis and to prevent sulfadiazine crystal formation in the kidneys. Solution containing potassium should be given to eliminate hypokalemia after initial shock and dehydration are relieved.

Prophylaxis

- A Cholera vaccine 0.5 cc. initially and then 1.0 cc. subcut after a 7 to 10 day interval. Repeat 1.0 cc. every 4 to 6 months.
- B Rigorous isolation of all cases and careful decontamination of secretions is important. In endemic areas all water and milk must be boiled and protective measures against flies must be used.

LEPROSY (code No 010 124)

Leprosy is a chronic disease caused by *Mycobacterium leprae* and characterized by aesthetic granulomatous nodules or macular skin lesions. Enlargement of nerve trunks may be noted by palpation. Multiple atrophy may be seen. The organism may be demonstrated by biopsy but nasal secretions may reveal its presence.

Treatment consists of giving Thiophene Sodium N.N.D. (Promizol®) 0.25 to 1.0 Gm. every 6 hours orally or Glucifone Sodium N.N.D. (Promin®) 4 cc. I.V. daily for 3 weeks followed by an interval of rest for one week (continuous or prolonged periods). Hemolytic anemia should be guarded against by frequent blood counts. May also treat with Isoniazid N.N.D. (INH) 5 mg./Kg. body wt. per day in 3 or 4 doses.

DISEASES DUE TO SPIROCHETES

(Syphilis d s s s e d o p 436)

RELAPSING FEVER

(Louse borne code No 010 1411)

(Tick borne code No 010 1412)

Relapsing fever is characterized by recurring febrile episode of 3 to 5 days in duration following bite by an infected tick or louse. Diagnosis may be confirmed by demonstration of Borrelia recurrentis in the blood on direct examination or by animal inoculation.

Treatment consists of giving (1) penicillin 50 000 unit I M every 3 hours or penicillin procaine 300 000 units I M daily for 10 days or (2) tetracycline drug 0.5 Gm every 6 hours orally. Chloramphenicol (Chloromycetin®) or oxytetracycline (Terramycin®) may be expected to prove effective. Give supportive and symptomatic measures as needed.

LEPTOSPIROSIS (Weil's Disease) (code No 010 142)

Spirochetes are characterized by severe constitutional symptoms, prostration, skin lesions, and a disphagic history of contact with rat may be obtained (as seen in war hoosmen). Dark field examination of the blood or urine revealing the leptospira characterizes the disease. Specific agglutination of the diagnosis. Aspt meningitis, pneumonia and pleural fever are also caused by leptospires.

Treatment consists of giving tetracycline drug 0.5 Gm every 6 hours orally or penicillin 100 000 units every 3 hours I M. However the role of antibiotics in treatment still being debated. Give supportive and symptomatic measures as needed.

RAT BITE FEVER (Sodoku) (code No 010 134)

Rat bite fever is caused by Spirillum minus and is characterized by a recurrent febrile attack with site of inoculation accompanied by regional dermatitis, fever, and a macular rash. The fever is periodic and recurrent.

Treatment with penicillin 100 000 unit every 3 hours I M or penicillin procaine 300 000 units I M every 12 hours or tetracycline drug 0.5 Gm every 6 hours. Give supportive and symptomatic measures as indicated.

YAWS (Framboesia) (code No 010 146)

Yaws is an infectious disease produced by Treponema pertenue and is characterized by granulomatous lesions of the skin, mucous membranes, and bones. Yaws is rarely fatal.

D gnosis

Yaws is acquired by direct contact with the mother. The mother has a painful papule which later ulcerates, appearing 3 to 4 weeks

after exposure Six to 13 weeks later similar secondary lesions appear and last for several months or years Late gummatous lesions may follow Visceral involvement is rare The Wassermann and flocculation tests are positive and the spirochetes may be demonstrated by dark field examination

Cleanliness of lesions is most important in treatment Specific measures consist of giving one of the following (1) penicillin procaine 300 000 units I M daily for 7 to 10 days (2) tetracycline drugs 250 mg every 6 hours for 10 days or (3) dichlorophenarsine (Cloarsen®) 40 mg I V weekly for 3 to 6 weeks

INFECTIOUS DISEASES OF UNDETERMINED ETIOLOGY

VINCENT'S ANGINA (Stomatitis) (code No 610 141)

Vincent's angina is an ulcerative infection of the oropharynx of doubtful etiology Fusiform and spirochete infection and herpes simplex virus have been incriminated

Treatment

A Specific Measures (Probably against secondary infection)

- 1 Penicillin trochea 5000 units to be sucked constantly
- 2 Penicillin procaine 300 000 units daily I M in several courses

or 3 Tetracycline drugs chloramphenicol (Chloromycetin®) may reduce secondary infection (see pp 507 to 510)

B General Measures

- 1 Sodium perborate or hydrogen peroxide mouth washes
- 2 Correction of oral hygiene by a dentist

INFECTIOUS MONONUCLEOSIS (code No 610 1301)

Infectious mononucleosis is an infectious disease probably of viral origin with protean manifestations the commonest of which are sore throat and lymphocytosis Illness is occasionally prolonged for months deaths are very rare

Diagnosis

Clinical symptoms are extremely variable Sore throat fever and malaise are common Lymphadenopathy and splenomegaly usually occur Exudate may be present in the throat Initial leukopenia is generally succeeded by the appearance of a marked number of abnormal appearing lymphocytes Sheep erythrocytes generally appear at some time during the course of the disease but may be transient Various rashes may be noted Infection period and period of infectivity are not established

Treatment

A Specific Measures Many agents have been proposed as affecting the course of the disease To date none have proved effective

B G r l M e s e s

- 1 Bed rest until af brile
- 2 Analgesia with Aspirin or codeine if required
- 3 Hot saline = 30% glucose throat irrigations or gargles 3 or 4 times daily may help
- 4 In severely ill patients symptomatic relief may be afforded by corticotropin (ACTH) or one of the corticosteroids (see p 424)

Tre tm nt of Compli cation

- 1 Hepatitis (code No 680 130) myocarditis (code No 430 130 9) or encephalitis (code No 930 130) may occur and are treated symptomatically
- 2 Rupture of the spleen (code No 520 130 5) requires emergency splenectomy. Frequent vigorous palpation of the spleen is unwise

Pr ophylaxis

N e

DISEASES DUE TO PROTOZOA**MALARIA**

Malaria is an infectious disease which is caused by one of several species of protozoa of the genus *Plasmodium*. It is ordinarily transmitted only by the bite of a mosquito. There are 3 main species infecting man

- 1 *P. vivax* (code No 010 1571) Causes vivax or benign tertian malaria
- 2 *P. malariae* (code No 010 1572) Causes quartan malaria
- 3 *P. falciparum* (code No 010 1573) Causes falciparum or severe malarial fever. Probably the most dangerous because of its tendency to attack the brain

Diagnosis

A History The disease is characterized by paroxysms of chills followed by fever and sweating which may occur every day (quotidian), every other day (tertian), or every third day (quartan). The presence of unexplained fever in patients in endemic areas presumptively indicates falciparum malaria. Specific antimalarial therapy should be used in such cases even though organisms cannot be demonstrated. Other diseases do not distinguish themselves from malaria as regards the benighted diagnosis.

B Laboratory Examination The specific diagnosis is made by finding on microscopic examination of *Plasmodium* in thin and thick stained blood smears or bone marrow smears.

Treatment

Modern treatment of malaria therapy represents a rational approach based upon biological concepts of this disease. These concepts distinguish between the phases of each type of malaria requiring special drug therapy. The principal antimalarials and a discussion of their drug follows.

- A Specific Measures** The following is a description of the available antimalarial drugs, dosages, indications, and toxicity.
1. **Chloroquine** An effective agent against all forms of malaria. *Treatment of choice for all forms of malaria during acute attack.* It will terminate *P. falciparum* infection and prevents relapses of *vivax malaria* when administered in conjunction with primaquine.
 - a. **Therapeutic dosage schedule**
 - (1) Oral Chloroquine Phosphate U.S.P. (Aralen®) 1.0 Gm (15 gr) as initial dose, 0.5 Gm (7½ gr) in 6 hours and 0.5 Gm (7½ gr) daily for the next 2 days.
 - (2) Emergency treatment Chloroquine hydrochloride 0.203 Gm (3.5 gr) of base I.M. repeated in 6 hours if necessary. Follow with oral therapy as soon as possible. It is not necessary to administer this drug I.V. since an effective blood level is rapidly attained by the I.M. route.
 - b. **Suppressive dosage** 0.5 Gm (7½ gr) chloroquine di-phosphate weekly taken on the same day each week.
 - c. **Toxicity** There are few toxic symptoms from this drug when given in the above mentioned doses. These are mild headache, pruritus, anorexia, blurring of vision, tinnitus, and urticaria. If symptoms become severe stop drug and give amphotericin chloride 4.0 Gm (60 gr) Stat and 1.0 Gm (15 gr) every 4 hours as difficult to promote excretion of the drug.
 2. **Amodiaquine Hydrochloride** N.D. (Camoquin®) closely related to chloroquine chemically and pharmacologically.
 - a. **Therapeutic dosage schedule** Give 0.8 Gm (9 gr) of base first day and then 0.4 Gm (6 gr) daily for next 2 days.
 - b. **Suppressive therapy** 0.4 Gm (6 gr) (base) once weekly.
 - c. **Toxicity** Mild, similar to chloroquine.
 3. **Quinine** Oldest specific antimalarial drug. Useful in the acute attack of all types of malaria. Prior to the advent of new antimalarial agents, quinine was the drug of choice in the therapy of malaria. If none of the new and more effective agents are available, quinine is still a useful antimalarial drug in a resistant malarial attack.
 - a. **Therapeutic dosage schedule**
 - (1) Quinine Sulfate U.S.P. B.P. 0.6 Gm (10 gr) tid or lid for 5 to 7 days.
 - (2) Quinine Dihydrochloride N.F. B.P. 0.85 Gm (10 gr) in normal saline glucose salt mixture or plasma injected I.V. VERY SLOWLY (not more than 50 mg of salt per minute) patient 6 hours if necessary give no more than 3 injections in 24 hours. May also be administered by I.V. drip at the rate of 2.0 Gm (30 gr) in 24 hours. Follow with oral therapy as soon as possible.
 - b. **Suppressive dosage** Quinine sulfate 0.308 Gm (5.10 gr) daily while in endemic area.
 - c. **Toxicity** Quinine in the above dosage may cause cinchonism (tinnitus, vertigo, deafness, headache, visual disturbance) in some individuals. (The drug is a

far less effective than the put a dose suppresses the growth of the new and less toxic preparation. The possibility of blackwater fever is being disregarded at the conclusion of the study appears to be higher in quinine treated cases.

4. Proguanil hydrochloride (Paludrine®). Although not a definitive agent for the treatment of the acute clinical attack this is a good suppressive drug for all forms of malaria. It has tendency to produce renal colic.
 - a. Dose: 1 to 2 g daily for 10 to 14 days.
 - b. Toxicity: Slight. Large doses cause nausea, vomiting, diarrhea, and mild hematuria.
5. Pyrimethamine (Dapsone®) although not recommended for the treatment of the clinical malaria is a effective agent for prophylaxis.
 - a. Dose: 1 to 2 g daily for 10 to 14 days.
 - b. Toxicity: Very low at recommended doses.
6. Primaquine Phosphate (U.S.P.). The network has shown this drug to be the most effective agent for the treatment of the acute attack. This drug is employed to reduce the duration of the clinical attack. It will prevent relapses in the majority of cases.
 - a. Dose: 1 to 2 g daily in divided doses of 140 mg 4 times a day for 14 days.
 - b. Toxicity: Clostridial infection, hemolysis, and methemoglobinemia.
7. G. al. M. The onset of the disease is usually not definite. The symptoms are usually mild and in the immediate period of infection.

AMEBIASIS (code N 010 151)

Am. bi. as. c. ter. h. ic. infection caused by the protozoan Entamoeba histolytica. Although the infection is primarily in the colon it is also a life threatening body tissue to be in the ad. The term am. bi. i. p. p. h. to both the cyst and the clinical disease. The term am. bi. i. p. p. h. to both the cyst and the clinical disease. The term am. bi. i. p. p. h. to both the cyst and the clinical disease.

A. Am. bi. Colitis (Dysentery) (code No 640 151)

1. A. i. With diarrhea and other gastrointestinal symptoms.
2. Ch. o. ic. Without diarrhea.

B. H. pati. Am. bi. al.

1. H. p. ut. Acute infection of the heart (code No 680 151)

- 2 Liver abscess Acute or chro = (code No 880 151 2)
- Amebiasis of other organs (uncommon) lu g b al etc may be involved
- D Asymptomatic amebiasis (carrier state?) may actually be a latent phase of the disease

Diagnosis

A history of exposure to infection in endemic areas or in epidemics is important but remember that there is an almost world wide incidence of the disease. A past history of dysentery or diarrhea (especially known amebiasis) is exceedingly valuable

A Amebic Colitis

- 1 Bloody diarrhea is frequently present during acute phase
- 2 Stool examination
 - a Blood and mucus may be present but there is usually comparatively little pus (cf bacillary dysentery = 278)
 - b Cysts and/or trophozoites of *E. histolytica* should be demonstrated. Repeated stool examinations of carefully collected fresh specimens are necessary for this
- 3 Fever and leukocytosis may be present
- 4 Multiple vague gastrointestinal symptoms may be present in the chronic phase of amebic colitis
- 5 Sigmoidoscopic examination may reveal amebic ulcerations

B Amebic Hepatitis and Liver Abscess

- 1 Symptoms of dyspepsia may be present
- 2 Signs and symptoms of adjacent right chest involvement may be present
- 3 Liver may be enlarged and is frequently tender and even painful. Occasionally a localized mass is palpable when abscess is present. Liver function tests may be abnormal
- 4 Mild to moderate leukocytosis and fever may be found
- 5 Stools do not usually show *E. histolytica*
- 6 X rays may reveal alteration of contour of diaphragm, hepatomegaly = right lower chest involvement
- 7 Material (anchovy paste like) may at times be aspirated from a fully localized abscess mass

■ Amebiasis of Other Organ Diagnosis is difficult and is possible only by maintaining a high index of suspicion of specific organ involvement (based on clinical manifestations) in patients with known or suspected amebiasis

D Asymptomatic Amebiasis This diagnosis must be reserved for cases in which routine stool examination reveals cysts of *E. histolytica* but clinical findings (including sigmoidoscopic examination) are completely negative

■ Therapeutic Test A therapeutic trial of antiamebic drugs particularly chloroquine or emetine may be warranted

- 1 If diagnosis is doubtful after careful investigation and amebiasis (especially hepatic) is clinically suspected
- 2 If fulminant diarrhea is present and diagnosis is clinically suspected but cannot be established and no other organism can be found

Treatment

A General Measures

- 1 Report case to local health authorities
- 2 Bed rest is required for certain cases

With Frank

dys tery hepatic & oth r non enteric involveme t and all patients receiv g emetine therapy (See below)

3 Diet

a If diarrhea is present follow the dietary measures as outlined for n ospe ific diarrhea (see p 258)

■ If ther is hepatic disease follow the dietary measures with ed d r th management of chr ni hepat m disease (see p 281)

■ Iron salts ho ld b given if anemia i pres nt (see p 219)

B Active or Chronic Amebic Dys tery

- 1 Sp cif d g In the presence of dys nt ry it is probably safe to assume that organisms have invaded extra intestinal tissues. With this in mind n ad qu te course of therapy should include not only an gent eff ctive against intestinal form but also a d ug which is effect v in the extra int ti al tis es (see table below)

Effectiveness of Anti amebic Drugs

	Chlo o quin	Em etine	Ca ba on Milb [®]	Vio form [®]	Eyth o mycin	Fum gillin
Int est l						
O gan m	±	±	+	+	+	+
Extra intestinal						
O gan m	+	+			±	±

Combination of hlo quine (o emetin) and an mical (a ba s n or Milb[®]) or an iodine containing compound (Vioform[®]) are commonly employed. If the organisms prove resistant ethromycin or fum gillin can be tried. Details are given below.

Chloroquine Phosph[†] U S P (Ar let[®]) 0.5 Gm (7½ gr) (0.3 Gm of the base) b i d f 2 day follow d by 0.5 Gm (7½ gr) i d i l y f 7 to 10 d y

■ Emetin Hydrochloride Inject U S P 5 mg (1 gr) daily sub t f r 6 d ys will control acute symptoms. Radical test infection in 15 percent of cases. Emetin is better placed by less toxic and equally effective gent such as hlo quine (see above).

Carbarone U S P B P 0.25 Gm (3¾ gr) i d i l y f r 7 to 10 day. o Glycyl 1 mg F (Milb[®]) 0.5 Gm (7½ gr) i d f 7 day

d Iodo chlorhyd[†] in U S P (Vioform[®]) 0.2 Gm (¾ g) t d o i l y f 14 d ys

Eyth my U S P 1 mg p Kg body weight d i l y f 10 to 14 d y. This antibiotic is effective for the treatment of amebiasis.

f Fumgillin N N D (Fumidil[®]) 0.5 to 1 mg p Kg body weight d i l y f 10 to 14 days. Employed for drug resistance of the protozoans.

- 2 Evaluation of therapy. Following completion of therapy the weaked microtocolonthesis is carried out. If still positive repeat bow or of examination. If negative give no further treatment. Re-examine stool.

at 4 week intervals until a total of 12 specimens have been found to be negative

3 Toxic reactions of the anti amebic drugs

- a **Emetine hydrochloride** *Contraindicated in myocardial disease* Nausea vomiting muscular weakness neuritis myocarditis and prostration may occur Special observations and precautions include the following
- (1) Bed rest without lavatory privileges
 - (2) Blood pressure determination \equiv i d
 - (3) Pulse determination q i d
 - (4) Daily examination of patient
 - (5) Ecg before and after course of therapy
 - (6) Withd aw drug in the event of toxicity
- b **Arsenic containing compounds (Carbarsone Milbilis[®])** *Contraindicated in hepatic disease* Nausea vomiting colic diarrhea and dermatitis may occur Daily inspection for toxic symptoms is necessary Stop drug in event of toxic reaction
- Iodine containing compounds Iodochole hydroxyquin (Vioform[®]) *Contraindicated in renal disease* Gastrointestinal upsets and diarrhea may occur Daily inspection for toxic effects (uncommon) is necessary Stop drug in event of reaction and resume after few days with smaller doses

C Hepatic Amebiasis

1 Measures for hepatitis

- a **Chloroquine Phosphate U.S. (Aralen[®])** is the drug of choice in hepatic amebiasis since it has proved to be effective in emetine resistant cases and is much less toxic Like emetine this drug has rather feeble intestinal effects it is therefore necessary to follow the course of chloroquine with Vioform[®] carbarsone or one of the antibiotics notably erythromycin or fumagillin (see above)
- Dose Chloroquine diphosphate 0.5 Gm (7½ gr) (or 0.3 Gm of the base) b i d for 2 days followed by 0.5 Gm (7½ gr) daily for 12 to 18 days
- or b **Emetine hydrochloride injection** 60 mg (1 gr) subcut daily for 9 days if chloroquine is not available or fails to provide a definitive therapeutic effect
- c **Erythromycin** and fumagillin now under trial may prove to be equally effective against both hepatic and intestinal amebiasis
- d **General supportive measures** should be instituted as for infectious hepatitis (see p 279) A 2 week rest period may be followed by a period of rest of treatment After the patient has convalesced from his hepatic disease further anti amebic drug therapy might be considered in an effort to eradicate the intestinal infection

2 Measures for liver abscess

- a **Treatment for hepatitis (see above)** If patient responds to chloroquine or emetine treatment follow \equiv with other amebicides for a period of 2 weeks (see p 481) A repeat course alternating these drugs may be necessary after a rest period of one week
- b **Small abscess** If patient responds to treatment use combined and then alternating

- met c and othe drug therapy (see abo)

■ **La g ab e s** If patient does not show definite response to metin = chloroquine 1 time t

(1) Continue treatment and fully attempt to localize abscess site by physical and ray finding. Aspirate under aprotic conditions (preferably operating room) and repeat aspiration if necessary. Avoid open drainage unless abscess is secondarily infected.

(2) Continue the therapy (see above) until evidence of both hepatic and intestinal disease is indicated.

d \$ condarily inf ted absc 98

(1) If asp rat d mate l r veals pas and o gatusms (by am ar and cultu) itm yb nece ary to stabl N pend in st (by extra ro s acc oaths)

() Chemotherapy agents should be employed in the
areas (a pp 496 514)

(3) Complete name of antibiotic the apy is for
hepatitis or liver abscess if indicated (see above)

3 Observe for toxic reactions (p 482)

D Am bl f Oth Org a Sp if c the pyas fo ul r
h nic me b c dys te y

E A ympt m tic Arnebasia (C r r State)

1 F l c s Som l n a f l t a m e b s i e l w a y h a
systemic as w i l s l c a l e f f c t a d r o m r u e d a f u l l
c o u s o f t h p y f o a u t o h r o n c d y s e t e y (p
481)

2 Simple oral ambulatory treatment considered satisfactory by the clinicians

* Ca ba se on 0 5 Gm (3 3/4 g) t t d o n ly fo 7 d y

b V of m^g 0.25 Gm (3 3/4 g) t t d o lly f 14 d y

c Follow pistol examination should be performed as for
a team because of it. (a.p. 481)

F Follow p Pate is sh l d b f l l w e d b y h i m a l s d l b o
t y e a m i n t o a l l t o n o c a m h m o n t h f o 3 t o
6 m o n t h s f o l l o w i n g t h a p y E x a m i n a t i o n s h o l d i n l d a g
m i d o s p y d e t u d y f f h a t o o l o n 3 a s e v e d y e
(p e f a b l y a t l e s t i f o l l o w i n g a l i n e e t h a r } H p e t e x
a m n a t i s h o l d b e p f o r m d w t h i n a y s i f n e c s a r y
N e d f h m o t h r a p y m u t b b a d p o n a t u a l d m o n t a
t i o o f a m b t h e t h n m e p s e c e o f y m p t o m (e g
h o n i d h a) C o o d e t h p o s s i b i l i t y f m p l i a t o n s f
t h d a s i e s o n d a y i n f t i t i o n o f b o w l f o m
c h m o t h p y p y h i c t r a u m e t w h n p e s i s t e n t s y m p t m
a t b i t i d b y l a b o t r y f d i n g A v o d o v t e t
m t w t h m i l o o t h d r g

GIARDIASIS (cod No 604 155)

Gard is m if st d by e nt pl o d s of w tery s m
ld o b lky and ft f l m l l g tool A m l d t h l
h i y t t i s m a y o r The p f c d a g r i s m d e b y d m
r t i o n f G d i a l a m b i i (t t s t i n l i) n t h t o o l

Hyd hl d N N D (C moq ^e) ingl d e f 0.6 Gm (9 g.)

Repeat if necessary Repeat stool examination after one week to determine efficacy of treatment

TOXOPLASMOSIS (code No 010 1577)

Toxoplasmosis is a disease of man and animals caused by *Toxoplasma gondii*. It is most frequently encountered in the newborn who acquire their infection in utero. Active toxoplasmosis is rare in adults although inapparent infections recognized by serologic tests are not uncommon in the general population. Infants and young children with the disease show evidence of chorioretinitis, cerebral calcification, hydrocephaly or microcephaly and profound psychomotor disturbances. Convulsions may occur. Little is known of the mechanism of transmission of the parasite from one host to another. Clinical diagnosis is most frequently established on the basis of the presence of cerebral calcification and chorioretinitis. In fact, the latter may be the most important single manifestation of acquired toxoplasmosis. For laboratory confirmation the organisms may be demonstrated in smears of blood, bone marrow, C.S.F. or exudate from serous cavities. *Toxoplasma* can usually be demonstrated in laboratory mice following intracerebral and intraperitoneal inoculation of fluids, tissues or smears. The complement fixation test and the microchemical dye test of Sabin and Feldman are the most useful diagnostic procedures.

There is no effective treatment although combined therapy with sulfadiazine and the antimalarial pyrimethamine (Daraprim®) has shown encouraging results in murine toxoplasmosis and in a limited number of human infections.

DISEASES DUE TO METAZOA

TRICHINOSIS (code No 255)

Trichinosis is caused by the ingestion of raw or improperly cooked infected pork. It can also be traced to other individuals who have consumed the same infected food. The incubation period is from 3 days to 4 weeks.

Acute manifestations may be very mild or may be fatal. Nausea, vomiting, cramps, diarrhea, flatulence and constipation occur early and are followed after a few days by fever, chills, weakness, rash, periorbital and dependent edema, splinter hemorrhage, pain and tenderness in muscles and eosinophilia. A systemic or peripheral neurological involvement may be present with headache as a prominent feature. A delayed reaction to the trichinella skin test (not done only after 12 to 24 hours) is characteristic in the disease (3 days to 7th day).

Chronic infection is manifested by vague weakness and other symptoms referable to multiple organ systems. Eosinophilia is often marked. Muscle biopsy may demonstrate organisms. An immediate reaction to the trichinella skin test (noted after 5 minutes) occurs late in the disease (from 17th day on).

Treatment is supportive and symptomatic. Severe acute cases require hospitalization and excellent nursing care. Cortisone

(ACTH) and the corticosteroids provide effectively relief for the acute symptoms. A reduction of the eosinophil count and appearance of fibrin and splinter hemorrhages if present and a general improvement in the clinical status of the patient are guides which should be employed to determine the efficacy of treatment. In the acute stage treat with relatively large doses of either drug for the first 24 to 48 hours (see p. 423). In the subacute stage therapy may have to be continued for several days or weeks to prevent recurrence. Doan has reported keeping symptoms under control (see p. 423).

ASCARIASIS OR ROUNDWORM DISEASE (code No. 650 241)

Infection with *Ascaris lumbricoides* may cause no symptoms or only mild abdominal and nervous symptoms. Occasionally general edematous reaction may develop rarely a carcinoma may result. The specific diagnosis is made by finding the worm's eggs or the worms in stools or vomitus or by observation of the adult worm passing from nose or mouth.

Treatment.

- A Hexyl or in 1 U.S.P. (d.g. of ch. l. f. ad. lts.)
 - 1 Int. l.p. gnt. o. Gve 30 Gm (1 o.) of gnt. m. s. lal. in water o. 240 c (8 o.) of oil tlon. of magn. sium cit. at th. night bef. e dr. gth. s py.
 - 2 A light m. s. l. s. giv. n th. pre. ding ev. ning and th. n. n. food until at least 5 hours after t. gth. hexyl. ssor in l.
 - 3 Alcoh. l. l. ont. ind. at d. bef. e and d. ring t. eatment.
 - 4 H. yl. or inol. 5 hard gel. tin. pe. les. 2 Gm (3 gr.) (c. ysto. d.) (t. lal. 1 0 Gm. 15 gr.) a. giv. in th. morning on an empty stom. h. Thes. a. to b. swallowed wh. le not chewed. Do. r. fo. child. n. Und. 6 yea. s. of age 0.4 Gm (6 g.) 6 to 8 y. s. 0.8 Gm (9 gr.) 8 to 12 yea. s. 0.8 Gm (12 gr.)
 - 5 E. rgation. Two ho. s. late. giv. 30 Gm (1 s.) magne. sium s. lal. in wat. r. to know th. wo. m. s. f. om. th. b. wel. Re. g. t. 2 hou. s. lat. if nec. y. fo. pu. gatio.
 - 6 Stool examination should b. mad. one w. k. lat. r. on. s. c. cessiv. day. s. t. d. c. r. main. eff. cy. of t. t. m. nt.
 - 7 T. stment. m. y. be. p. t. d. in 3 day. s. if. e. ry.
- B P. s. l. Cit. te. N. N. D. (Ant. par.®) (D. g. of cho. s. childr. n.) Each c. of th. sy. up. costal. 100 mg. p. p. sin. s. ahydr. t. tabl. t. equ. valent: 250 and 500 mg. r. iv. 5 to 7 d. y. o. as. ms. follows (da. ly. do. g. s.)

Up to 15 lb.	1/2 tsp. o. one 250 mg. t. bl. t. da. ly.
15 to 30 lb.	1/2 tsp. or on. 250 mg. t. bl. t. b. d.
30 to 60 lb.	1 t. p. or. c. 500 mg. tabl. t. b. i. d.
Ove. 60 lb.	2 tsp. o. two 500 mg. t. bl. t. b. i. d.
- C Di. thyl. arb. m. lo. Cit. t. U.S.P. (H. t. san.®) Gve 3 to 6 mg. /Kg. body wt. o. lly. 3 tim. d. ly. fo. 7 t. 11 day. s. A. syrup. p. pa. tion. o. tain. g. H. t. a. an.® powde. in. s. on. str. s. of 30 mg. / is. e. mm. d. d. f. sin. ll. hldr. s. Admin. lat. 12 mg. /Kg. body w. ight. o. e. ad. y. f. r. 4 d. ya. s. or 8 10 mg. /Kg. body w. ight. t. i. d. f. 7 10 d. y. Wh. H. t. a. an.® is. u. ed. fo. radi. ti. of *Ascaris lumbricoides* p. e. lre. tm. t. f. tling. a. d. post. t. t. m. nt. pu. g. tio. a. p. t. ne. cas. y.

- Oil of Chenopodium and Tetrachloroethyl ■ May be used if other preparations are ineffective or not available. Caution: Tetrachloroethylene stimulates activity of ascaris and may result in bowel obstruction. A preliminary course of hexylresorcinol is advised before using the combined method.
- 1 Follow procedure of treatment as mentioned above for hexylresorcinol.
 - 2 Oil of chenopodium 0.3 cc ($4\frac{1}{2}$ w) capsule and tetrachloroethylene three 1.0 cc (15 w) soluble gelatin capsules (total dose 3.0 cc 45 w) are given together and followed by purgation as mentioned above.

ANCYLOSTOMIASIS OR HOOKWORM DISEASE (code No 630 243)

Most commonly caused by *Necator americanus* or *Ancylostoma duodenale* the disease occurs when a sufficient number of the worms are present in the intestine. It is manifested by fatigue, weakness, dyspnea, palpitation, anorexia, perverted appetite, weight loss, and a mild microcytic anemia. Ground itch, an erythematous or maculopapular or vesicular pruritic dermatitis, may develop at the site of penetration of the skin by the larvae. Specific diagnosis is made by finding the eggs in the stool.

Recent work indicates that symptoms are most often due to a coexisting deficiency disease. Correction of the malnutrition by adequate dietary means and of the anemia by the addition of iron appears to all-viate or remove the manifestations in the absence of specific treatment for the hookworm infection.

Treatment.

- A General Treatment. Estimation of the need for treatment should be based upon quantitative counts of the eggs in the stools. There is no indication for treating light infections, particularly after completion of previous therapy. It is often impossible to completely eradicate the infection.
- 1 Correct malnutrition. Provide an adequate protein diet with supplementary iron medication (see p. 218).
 - 2 Rule out possibility of coincidental ascariasis. If ascariasis is present or when diagnosis is difficult, a limited give preliminary hexylresorcinol as prescribed for ascariasis (see p. 485). Tetrachloroethylene stimulates ascariasis activity which occasionally results in intestinal obstruction. If large numbers of hookworms are still present following the administration of hexylresorcinol wait one week following the last dose and give tetrachloroethyl n.
- B Specific Treatment.
- 1 Tetrachloroethylene U.S.P. B.P. (drug of choice). First correct malnutrition and anemia. Tetrachloroethylene is contraindicated in patients with alcoholism, chronic gastrointestinal disorders, severe constipation, hepatic disease, and in patients undergoing hypomyelination. Correct these conditions before giving treatment.
 - a Initial purgation. Give 30 Gm (1 oz) magnesium sulfate in water or 240 cc (8 oz) magnesium citrate solution the night before drug therapy.

h The meal of the preceding evening should be light no food should then be taken until the patient gets on after treatment has caused a copious bowel movement Alcohol and fatty foods should not be taken for at least 48 hours prior to drug therapy

Tetrahydrothyl the 10 c (15m) soluble gelatin capsules (total 30 cc 45m) should be given in the morning on an empty stomach

d Purgation 2 to 3 hours later give 30 Gm (1 oz) magnesium sulfate in water to remove worms from the bowels if no patient gets on results within 4 hours repeat 30 Gm (1 oz) magnesium sulfate enema or any means to hasten evacuation

Examine stools with a later on 3 successive days to determine efficacy of treatment

f Repeat treatment 2 weeks later if indicated

g If rosenidate 0.2 to 0.3 Gm (3.5 gr) treatment dose may be given if necessary

2 Hydroxyresorcinol may be used if tetrahydrothyl is contraindicated ineffective or not available (see p 485)

STRONGYLOIDIASIS (code No 604 256)

Infection with *Strongyloides stercoralis* manifested by pigastria discomfortable gastrointestinal disturbances watery mucus stools and eosinophilia Fever, weakness and weight loss may be present and at night dermiprurism may occasionally occur Specific diagnosis made by demonstration of motile threadiform larva in the stool (copium)

Treatment consists of giving ge-tianol 60 mg (1 gr) every hour until 3.3 Gm (50 gr) have been taken 1 1/2 hours after last dose of tablet Old children should receive adult dose Young children a daily dose of 10 mg (1/8 gr) if achy of present (not chronological) age not exceeding adult dose For febrile cases 25 of a 1 per cent aqueous

solution of gentian violet medicinal powder may be instilled into the duodenum Red coloration by 1/3 of the compound discontinue treatment if any of the following appear even a pigastria discomfort, fever, nausea and/or vomiting a violet discoloration of the

ENTEROBIASIS OR OXYURIASIS (code No 604 242) (Pinworm or Seatworm)

Infection with pinworms is especially annoying to the perianal pruritus usually most intense at night and frequently in the evening several members of a household in infection it occurs most commonly in children They are often a variable vague gastrointestinal and nervous symptom The perfect diagnosis is made by demonstration of the eggs of Enterobius (Oxyuris) vermicularis in the perianal or perineal area (Steth's ellul tape or other methods) Eggs are not commonly found in the stool

TreatmentA General Measures

- 1 Examine for and treat all infected members of the family and other groups of close contacts since infection from non treated contacts is frequent
- 2 Instruct patient and/or household members with respect to
 - a Careful washing of hands with soap and water after defecation and again before meals
 - b Keeping fingernails trimmed close and clean
 - c Voluntary abstinence from scratching of involved areas
 - d Apply carbolated petrolatum to anal region following every defecation. Thoroughly wash anal region in morning with soap and water
 - e Daily morning showers or stand up bath with soapy water
 - f Scrubbing of toilet seats with soap and water daily
 - g Cleaned boiled bed linens 2 times weekly
 - h Use of pajamas (or sleepers for children) to prevent manual contact with anal region during night
 - i Discourage patients from putting hands in mouth
 - j Raise temperature of sleeping rooms as high as possible for one hour daily then as thoroughly

B Specific Measures (listed in order of effectiveness)

- 1 Piperazine Citrate N.M.D. (Antepar®) (syrup or tablets)
Each cc of the syrup contains 100 mg p.p. as nebulate tablets are equivalent to 250 or 500 mg. Administer daily for 7 days follow with a rest period of 7 days and then administer again for another 7 days. Use dosages given for Ascaris p. 485
- 2 Oxytetracycline (Terramycin®) Oral drop, oral suspension or capsules. Give 10 mg per lb body weight daily divided into 3 doses administered daily for 7 days
- 3 Methylthiouracil Chloride U.S.P. Crystal Violet B.P. (4-hour enteric coated tablet) 1 mg per lb body weight divided into 3 daily doses. Give daily for 8 days followed with a rest period of 8 days and then give again for 8 days

TAPEWORM INFECTIONS (code No. 604 261)

(Pork, Beef, Fish, Dwarf or more
rarely Dog or Rat Tapeworms)

Tapeworm infection is caused by consumption of contaminated raw or incompletely cooked pork, beef, fish, water fowl, or other contaminated food. The acute phase (usually after a long incubation period of 3 to 4 months) is manifested by diarrhea, fever, leukocytosis, and eosinophilia. The chronic phase is manifested by vague gastrointestinal and CNS symptoms, mild to severe anemia, and gravid proglottids in feces or underclothing. Specific diagnosis of infection with *Taenia saginata* (beef), *Taenia solium* (pork), and *Dipylidium caninum* (dog) is made upon presence of gravid proglottids in feces (occasionally by egg floats). Specific diagnosis of infection with *Diphyllobothrium latum* (fish), *Hymenolepis* sp. (rat) is made upon appearance of eggs in feces.

T eatm t

A Sp if Me u

i A p d n Oleo es n U S P E tr ct of Male Fe n B P

C tral duc tions Sev re cardi c hep tic o re al
d as co tipat on a ute o ch ic gastroe ter t s
febrile at tes pr gna y and inf s

ii L w res due f i fr duet f 24 to 48 hou s p o to d ug
the apy Alcoho l is o tr indic ted

c M gu um s flat or odi m sulfate 15 to 30 Gm ($\frac{1}{2}$
to 1 oz) in w ter i ga n the night before treatme t
Omit bre kfast on m rning of tr atm nt

d Admin te oleo in of asp d um i gelat n cap ul in
thr e qu l d es at half ho r into v ls ach d e on
tal ngf m 0.5 to 1.2 Gm d pend g on w ight of th
ii lant Childr sh uld eiv 1 m unps yea i age
*The drug should be fresh and not dispensed from
bottles which have been opened for some time*

e Magnesi m sulf te or od m sulfate 15 to 30 Gm ($\frac{1}{2}$
to 1 oz) in w ter g ven g n n two hou s following
admini t at on of last c p ule No food h ld be ps
mitted til the b wel mo e c p ou ly

f Repeat cou s of i atm nt in ot l s than 7 d ys if
s ary

g Alt n t m thod of dmi t at of oleo n of asp d
i m B

A pid m ol o in	4
M cil ge f s ia	30 cc
Co ent ated hull n	
of s d um sulf te	30 cc

Gi th muls o lly hyd od l t be in one d
mi st at o Post tr um tp g ti n s y
On h W th dosage t f t y fo ch ldre f hool
g

h Th p t t sh ld hav h i on b f
w m w tr to f i late p e ment and de taf t n
of th he d and progiott d To l t p p ho ld b d s
po d of ep i ly E min all stools p s d d i g
the ext 24 hour in order to ov the w rm h d f
p f f compl t dicat

2 Qu n r ne Hyd hi de U S P M p c Hyd o
hio d B P (Atab n *)

a On d yp edi g t eatm nt pat nt ts l ght low
r id e l n h and s ppe

ii Sod m lf t o magesi m s lf t 15 t 30 Gm ($\frac{1}{2}$
to 1) atha ii the night b fo t tm t

On morni g f t atm t om t b e kf t G we ph o
barb i l 30 to 60 mg ($\frac{1}{2}$ to $1\frac{1}{2}$ g) d pendi g up n
the w ight and ag of th p ti nt O ho l t adm n
t as smgle d e 0.5 to 1.0 Gm ($\frac{1}{2}$ to 15 g)
(dep d g o w ight of pat t) of quina crine hyd ochlo
r d long w th an qual amount of sod m bicarbo ii to
c ter t au ea and vomiti g

A mo ffectiv remo al of t pews m than is po ible
with o l m ii ali i tabl t form m y be accompl hed
by dmin st ri g quinae m hyd ochlo id thro gh a duo
d l tube

- d Sodium sulfate or magnesium sulfate 15 to 30 Gm ($\frac{1}{2}$ to 1 oz) in water is given 2 hours following therapy to rid the intestine of the parasite. No food should be permitted until the bowel moves copiously.
 - e Repeat course of treatment after 7 days if necessary.
- 3 Hexylresorcinol U.S.P.
- a 1.0 Gm (15 gr) in 20 cc water introduced into the duodenum by a tube. Follow in 2 hours with a sodium or magnesium sulfate purge. Examine stools for head of worm.
 - b Crystoids anthelmintic as administered in ascariasis (see p. 485) is the drug of choice for the treatment of light infections with *Hymenolepis nana* (dwarf tapeworm). For heavy infections use quinacrine hydrochloride as for treatment of *Taenia saginata* infections.

B General Measures. Hospitalization is recommended for the treatment of persons with tapeworm infection. Successful removal of the parasite can only be accomplished if there is cooperation on the part of the patient, the clinician, and the laboratory personnel. Proper pretreatment preparation of the patient and adequate postpurgative examination of stools for the head of the tapeworm is necessary.

SYSTEMIC MYCOSES

Mycotic infections are caused by a variety of fungi and have wide geographic distribution. Although their incidence is rather low in certain parts of the world some of them occur quite commonly, e.g., coccidioidomycosis in the S. Joaquin Valley of California. Their clinical manifestations are exceedingly variable with some resemblances to the granulomatous diseases.

COCCIDIIDOMYCOSIS (code No. 012.219) (Pulmonary code No. 360.219)

Coccidioidomycosis or Valley Fever is an infection due to *Coccidioides immitis* which is found in the Southwest United States, Mexico, and Central and South America with sporadic cases in Italy and Hawaii.

Diagnosis

- A Primary Form.** Involves the bronchi and lung and may manifest itself by fever, cough, erythema nodosum, and pleurisy with effusion. X-ray of the lungs during the primary disease shows patchy soft infiltration and this clears as dual nodular shadows may persist. Thin walled cavities with little surrounding infiltration may develop and remain in 6 months. The sedimentation rate is elevated, organisms may be found in the sputum by culture, and the skin test may be positive after 10 to 14 days. Complement fixation and precipitation are helpful in diagnosis and may aid in determining the prognosis of infection.
- B Chronic or Recurrent Form.** 0.2 p.p.c.c.t. of all primary cases progress to the granulomatous stage involving the lung, chest wall, or other structures. The finding of the organisms in infected tissue or in the discharge from the lesion in this stage makes the diagnosis. Prognosis in this form is poor.

Tr im nt

- N specific th r py is known for either form of the disease
- A P im ry Fo m Bed re t and symptomatic ca e until g cress
h s s bsded
- Ch o i Fo m Tre tm t ntir ly symptomatic Pot ss um
od ■ is f no value nd may even be dang ro

ACTINOMYCOSIS (Regional code No 0 202)

NOCARDIOSIS (Pulmonary code No 360 201)

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s s d by lity of a obic type belong g to th g us No rd a
(e g N t o des N m d e)

Diagnosi

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pu ale tm te i lco taining sulfur granules A y r g on of
the body m y ■ infect d but the head and n ka m s i f e
que tly involv d in wh h c s very little yet microsc tion
oc u The abdominal vis a may be i v lved by w y f th
int stun l tract r th lungs pleu a s d chest by w y of the
■ p rato y i c i In th latter two forms th m y be symp
tom f able to the ystem ff ted a comp ru d by hills
d fev r The fi ding of th typical ■ g sul in the
lesion i diagnot
- B No a d nfe ti m y s mbl class al ct nomy os with
the p od to f cha a te i g nules ar prod c a
p ■ dot b culo v l em nt of th lungs d ple a w th x
t o att m to bra n and mening s V rion sp s of
No a d c ■ infecti f the b uta tles e w th bo e
v lv ment (myc tom)

T m t

- A Act nomy Th t tm t of a ti my os m s i f e
q tly be ont n d fo w ka o m th
- 1 P nt lin is the d g of cho An unth l do f 120 000
nt h id be f ll w d by 80 000 unts ve y 4 h s Th
e of much high dos s is e comm d d by s me chm ans
■ lly nt am s la inj tions of 500 000 nits fo rvi o
fa la a tu nomy os s a d to rw million out ■ d y f
th p lmon y nd abdominal typ
 - 2 ■ l f di in The on mit nt ss of self di ine ha b ■
found b ■ fl al ■ rtain instanc
 - 3 Pots m lod de With som pati nt the above ombin d
med tion should be ppl m nt d by lod de th py but
t m s to m t be s d in If ve patient Gave
t : d e l t om f P ta slum lod d U S P s d ops
t d m g h d by o e d p t i d until e
tions occ s t i l of 20 d ops t i d is r a h e d Th
m y be f rth r inc a e d nd a s m ch s 100 drop t i d
m y b e d if th pat nt nt l rate th do g If re
a ti o c t p d r g and b g n again at a l e do g
ln s ti pat t if m y be c s s ry to st rt with i or

2 drops daily and gradually increase dose

- B Nocardiosis** Treat as for actinomycosis. The disease producing aerobic *Nocardia* are more susceptible to the sulfonamides than is *A. israeli*. Treat with sulfadiazine alone or combine with sulfamerazine. Maintain blood levels of 10 to 20 mg per 100 cc until infection is controlled. Patient should be maintained on sulfo amide therapy 3 to 4 months following apparent cure.

BLASTOMYCOSIS

(Generalized code No 012 200) (Of Skin code No 110 217)

North American blastomycosis chiefly noted in North Carolina, Illinois and Mississippi is due to *Blastomyces dermatitidis*. The South American variety is due to *B. brasiliensis* and is found mainly in Brazil.

Diagnosis

The North American variety produces granulomatous ulcerating lesions of the skin and tuberculosis like lesions of the lungs and at times of other structures. The cutaneous form usually is without systemic symptoms but the pulmonary form usually has symptoms not unlike those of pulmonary tuberculosis.

The South American variety involves the mucous membranes of the mouth, the skin, the lymphatic tissue and the viscera.

The diagnosis of either variety depends upon microscopic recognition of the characteristic yeast like fungus in tissues or exudates followed by isolation of the organism in culture.

Treatment

- A Potassium iodide therapy should be given as for actinomycosis (see above). Before administration of the drug the patient should be tested for sensitivity to the fungus and to the drug. If these cautions are not observed spreading of the infectious process may occur. At the beginning of the treatment only small amounts of potassium iodide should be used. Further more to prevent dissemination of the infection desensitization or immunization with *Blastomyces* vaccine may be necessary.
- B Stilbamidine has proved to be quite effective in the treatment of cutaneous and systemic blastomycosis. Dose: 10 to 200 mg daily not exceeding 2 to 3 mg /Kg daily. It is given slowly i.v. in 5% glucose water or in saline. A course of 30 days may be required. This drug has to be employed with caution since it is toxic and frequently produces a neuropathy especially of the fifth nerve. A related drug 2-hydroxystilbamidine has been used successfully on patients infected with *B. dermatitidis*. It fortunately does not produce peripheral neuropathy.
- C X-ray therapy may be used as an adjunct in the cutaneous cases. The systemic forms are rather resistant to treatment and progress in spite of therapy.

HISTOPLASMOSIS (code No 010 218)

Histoplasmosis is caused by *Histoplasma capsulatum* a small yeast like organism in tissue and a mold like fungus in culture. It has a world wide distribution. It primarily involves the reticuloendothelial system causing enlargement of the liver spleen and lymph nodes and systemic manifestations of fever anemia and leukopenia. However other systems may be involved. Patients from endemic areas often have pulmonary calcification negative tuberculin tests and positive histoplasmin skin test.

Natural immunity is known.

CANDIDIASIS (MONILIASIS)

(Pulmonary code No 360-208)

(Thrush of Mouth code No 610 209)

Candidiasis is an infection of the mouth vagina skin and nails. It may rarely involve the lungs and meninges. The diagnosis of the pulmonary form may be difficult because of scanty purulent sputum. A common finding is yeast appearance is similar to that of tuberculosis but tubercle bacilli cannot be demonstrated in the sputum. One must demonstrate the constant presence of *Candida albicans* before the diagnosis can be sustained. However the organism may occur as a normal inhabitant of the mouth so great care must be taken in making the diagnosis of pulmonary moniliasis.

Treat the oral infection with alkaline mouth washes and topical application of gentian violet diluted 1:10,000 in 10 percent alcohol for 4-5 days. Treat vaginal infection with alkaline douches douches of potassium permanganate 1:1500 or gentian violet 1:10,000. Propionate vaginal jelly may be used. For cutaneous infections soak in olive oil parts twice daily in 1:2000 potassium permanganate for 30 minutes. Follow with 1 percent gentian violet paint in 15 percent alcohol. For treatment and anal infection mycstatin (Mycostatin®) is an antifungal substance of value in eliminating oral genital number of *Candida* in the stool. It is recommended as a prophylactic therapy in cases of patient in intensive care. Prolonged therapy with antibiotics who may develop *Candida* infection. Give 500,000 unit tablet three times daily until all oral fungi disappear as determined by culture of stools. Dose may be doubled if necessary and the drug may be given concomitantly with any of the common oral antibiotics. Continue mycstatin throughout the course of therapy with the antibiotic along with and for short period after the administration of the antibiotic has been discontinued.

CRYPTOCOCCOSIS OR TORULOSIS

(Of Skin code No 110 21x) (Meningitis code No 910 21x)

Cryptococcus is known chiefly the kind of strain known as yeast may invade the structure. It is world wide in distribution and caused by *Cryptococcus neoformans* (*Torula histolytica*). The characteristic lesions are pustules granulomatous ulcers and nodules. Meningeal involvement of the central nervous

system lesion. The disease is usually mistaken for tuberculous meningitis if the organisms are not found.

No specific treatment is available. Treat symptomatically.

IMMUNIZATION SCHEDULES

Biologicals for immunization purposes are gradually being modified and concentrated. The schedules below do not apply to all preparations; follow the manufacturer's instructions which accompany the preparation.

Children

1. During first year
 - a. Uncombined method: Pertussis vac- three subcut injections of 0.3 cc each at one month intervals beginning at 2 to 3 months of age; diphtheria tetanus toxoid (alum or aluminum hydroxide) subcut injections of 0.5 cc and then 1.0 cc at one month intervals beginning at 6 months of age; and smallpox vaccination at 6 months to 1 year of age. Repeat if a take does not occur.
 - or b. Combined method: Diphtheria pertussis tetanus (combined) three subcut injections of 0.5 cc each at one month intervals starting at 2 to 6 months of age; and smallpox vaccination as with uncombined method.
2. At two years: Schick test and booster dose of diphtheria pertussis tetanus mixture 0.5 cc by subcut injection.
3. At school age: Repeat procedure as for two years and do vaccination (repeat if a take does not occur).
4. Smallpox vaccination every 5 to 7 years or on exposure.

Adults

Adults traveling to foreign countries should obtain a list of required immunizations when applying for passports. Those living in endemic areas should maintain their immunization.

1. Smallpox vaccination: Repeat every 3 years on exposure.
2. Typhoid (or typhoid-paratyphoid) vaccine (1 billion organisms per cc) 0.5 cc and then 1.0 cc by subcut injection at weekly intervals. Repeat series every 3 years.
3. Yellow fever vaccine (Africa-South America) 0.5 cc subcut.
4. Typhus vaccine (Cox type) (Europe-Asia-Africa-Australia-South America and Mexico) 1.0 cc subcut repeated 7 to 10 days later for total of 2 doses. Repeat 1.0 cc every 6 to 6 months.
5. Cholera vaccine (Asia-Near East-East Indies) 0.5 cc and then 1.0 cc every 4 to 6 months.
6. Plague vaccine (2 billion organisms/cc) (Egypt-Asia-East Indies) 0.5 cc and 1.0 cc subcut at interval of 7 to 10 days.
7. Tetanus toxoid 1.0 cc subcut repeated at 30 and 60 days for total of 3 doses. Booster injection of 1.0 cc 1 year later and on injury.
8. Diphtheria immunization in adults who are Schick positive is frequently followed by severe local and general reactions. A skin test (0.1 cc of 1:25 dilution of fluid to skin) should be applied intradermally. If negative 0.5 cc and

then 10 cc should be given at monthly intervals. If positive inject intradermally 0.1 cc of 1:10 dilution of toxin at 3 to 4 week intervals for 3 doses.

HYPERSENSITIVITY TESTS AND DESENSITIZATION

Before injecting antitoxin or similar material derived from animal source always perform the following test for hypersensitivity. If both tests are negative no desensitization is necessary and a full dose of the antitoxin may be given. If one or both of the tests are positive desensitization is necessary.

A Intradermal Test. Inject 0.1 cc of a 1:10 dilution of the antitoxin intradermally into the skin of the inner forearm of the forearm. A positive test is manifested within 30 minutes by the occurrence of a large wheal and surrounding areol.

B Conjunctival Test. Instill drop of a 1:10 dilution of the antitoxin into the conjunctival sac of one eye at a time and instill drop of physiological saline in the other eye as a control. A positive test is indicated by conjunctival injection, itching and edema occurring within 30 minutes.

Desensitization

A Preliminary Measure

- 1 Antihistaminic drug should be administered before beginning desensitization in order to lessen any reaction that might occur (see p. 45).
- 2 Epinephrin U.S.P. Adrenaline B.P. 0.5 to 1.0 cc (8-15 m) of a 1:1000 solution must be ready as a syringe for immediate administration.

B Desensitization Method. The following plan may be used in desensitization. Give doses of 1 m. at 30 minute intervals and observe closely for reactions.

- | | |
|-----------------------------------|-------------------------------|
| 1st dose = 0.1 cc (1:10 dilution) | 7th dose = 1.0 cc (undiluted) |
| 2nd dose = 0.2 cc (1:10 dilution) | 8th and subsequent doses |
| 3rd dose = 0.5 (1:10 dilution) | 1.0 (undiluted) every |
| 4th dose = 0.1 cc (undiluted) | 30 minutes until the total |
| 5th dose = 0.2 cc (undiluted) | amount of antitoxin is given |
| 6th dose = 0.5 (undiluted) | |

Treatment of Reaction

- A. If mild reaction develop at the next low dose and continue with the dose in that order. If a severe reaction occurs administer pinphrine as mentioned below and discontinue the antitoxin until the reaction subsides usually 24 to 48 hours. Should doses not be hypodermic or intramuscular slowly using gradual increase of the toxin.
- B. If manifestation of a severe reaction appears give 0.5 to 1.0 cc (8-15 m) of pinphrine subcutaneously. The symptoms in mild to a moderate reaction are dyspnea coughing hiccups shock. Maintain in a supine position of the patient and pet pinphrine as necessary.

Chapter 20

ANTI INFECTIVE CHEMOTHERAPEUTIC AGENTS

Sulfonamides antibiotics aminosalicylic acid and isoniazid are used for the treatment of bacterial and rickettsial infections for the treatment or prevention of secondary bacterial infections in virus diseases and for prophylaxis against streptococcal infections in patients with valvular heart disease (to prevent subacute bacterial endocarditis)

Precautions in the Use of Chemotherapeutic Agents

- 1 *Etiologic diagnosis is of paramount importance*
- 2 Indiscriminate use may lead to serious toxic reactions
- 3 Insufficient dosage or unnecessary administration for minor illnesses may permit the emergence of resistant strains
- 4 Certain combinations may antagonize each other Combined administration is probably best avoided except in exceptional clinical circumstances where the indications are clear
- 5 Topical administration (especially penicillin and Monamid) may sensitize the patient so that a severe hypersensitivity reaction may occur upon later systemic use

CHOICE OF ANTIBIOTICS IN BACTERIAL INFECTIONS

The choice of antimicrobial agents in the treatment of bacterial infections may be made in one of three ways

(1) The clinical appearance may be so characteristic of a given etiologic agent that specific antimicrobial therapy can be chosen without bacteriological examinations (E.g. meningococcal meningitis acute gonorrhea pneumococcal lobar pneumonia)

(2) The clinical appearance may be compatible with a variety of etiologic organisms in which case it is necessary to identify the specific organism by systematic culture. When the organism has been identified the antimicrobial drug of choice can usually be selected on the basis of clinical experience (E.g. penicillin for streptococcal infections chloramphenicol for salmonella enteritis ampicillin for meningococcal meningitis)

(3) If the drug of choice for an identified organism is not known (due to the variability of response to antibiotics on the part of some organisms e.g. staphylococci coliform bacilli) or if the organism itself is not known but can be isolated from clinical specimen antibiotic sensitivity test (see below) are required to determine which of several available antimicrobial agents is likely to have a bacteriostatic or bactericidal effect

Antibiotic Sensitivity Testing

The principles of antibiotic sensitivity testing are outlined below. However the immediate clinical situation must be borne

in mind and did not know whether to wait for the results before proceeding with antimicrobial therapy. In most instances empirical therapy has done as well as a presumptive of the logic agent may be begun without a sensitivity test. In a very few instances it should be begun and later reduced or discontinued if necessary.

It should be possible to perform a bacteriologic culture of the specimen (usually of the urinary tract) and infect one due to organisms likely to exhibit a considerable sensitivity in a sensitivity

A Plate Test - A culture of the specimen is plated on a plate with the clinical specimen (e.g., urine) poured through a filter with a paper culture and wait for 24 hours until the plate is dry. Place small filter paper discs at intervals with various antibiotics on the plate 2-3 cm apart. Incubate overnight. Drugs which fail to give an effect on inhibition are not likely to be clinically significant. The test organism NOTE: This is a crude rapid test which does not always correlate well with the results of a sensitivity test or with clinical response.

B Tube Test - The tube test assures more exactly the concentration of the antibiotic necessary to inhibit growth of a standard dose of the organism under standard conditions. A series of broth tubes containing graded amounts of an antibiotic is inoculated with a dilution of the broth culture of the test organism. After incubation the tubes are examined for turbidity. The end point is the point at which the concentration of antibiotic is just enough to inhibit growth of the organism. The tube is then used to determine the concentration of the antibiotic in the sample. In addition, the tube test is used to determine the sensitivity of the organism to the antibiotic.

SULFONAMIDE DRUGS

The sulfonamide drugs are derivatives of sulfanilic acid. Newer derivatives have wider antibacterial spectra and more rapid bactericidal action than the old sulfonamides. Since the activity of any sulfonamide compound may be predicted on the basis of its physicochemical properties it is evident that maximum antibacterial effectiveness has been approximated by a molecule in which the sulfonamide group is attached to a benzene ring. The old sulfonamide is rarely used (Gastrin[®]) and the newer sulfonamides are rarely used (Sulfamonomethoxypyridazine (Kynex[®])) a slowly excreted drug off the spectrum of activity.

Indications - Antimicrobial Spectrum (see table on p. 514)

The sulfonamide drugs have a wide but limited range of activity against pathogenic organisms. At the present time the sulfonamides are the only antimicrobials of choice only in meningococcal infection (N is same as nitroimidazole).

A Excretion - The sulfonamides are excreted in the urine and should be used as a salt rather than as a free base to avoid the toxicity of the free base. The salts are more soluble and less irritating to the urinary tract.

B Glucose Oxidation (F⁺ test[®]) this test is used to identify sulfonamides. If a sulfonamide (Diazotization[®]) are more soluble than the sulfonamide group which now produces within a limited range of usually 1-2 mg/ml of the drug is again the following pathogenesis

1 Mycobacterium tuberculosis

2 Mycobacterium leprae

ANTI INFECTIVE CHEMOTHERAPEUTIC AGENTS

Sulphonamide antibiotics, ampicillin, acid, and isoniazid are used for the treatment of bacterial and rickettsial infections for the treatment or prevention of secondary bacterial infections in virus diseases and for prophylaxis against streptococcal infection in rheumatic fever and heart disease (to prevent subacute bacterial endocarditis).

Precautions in the Use of Chemotherapeutic Agents

1. Chemotherapeutic agents may lead to serious toxic reactions
2. Dosage should be adjusted to the patient's condition
3. Do not use more than one drug unless necessary
4. Do not use drugs which are known to be antagonistic to each other
5. Do not use drugs which are known to be synergistic with each other
6. Do not use drugs which are known to be antagonistic to each other
7. Do not use drugs which are known to be synergistic with each other
8. Do not use drugs which are known to be antagonistic to each other
9. Do not use drugs which are known to be synergistic with each other
10. Do not use drugs which are known to be antagonistic to each other

EFFECTS OF ANTIBIOTICS IN BACTERIAL INFECTIONS

The effect of antimicrobial agents in the treatment of bacterial infections may be made in one of three ways:

- (1) The clinical appearance may be so characteristic of a given infection that the specific antimicrobial therapy can be chosen without the aid of laboratory examinations (e.g. meningococcal meningitis, streptococcal pneumonia, pneumococcal lobar pneumonia).
- (2) The clinical appearance may be compatible with a variety of bacterial organisms in which case it is necessary to identify the organism by culture etc. When the organism has been identified the antimicrobial drug of choice can usually be selected on the basis of clinical experience (e.g. penicillin for streptococcal infections, chloramphenicol for salmonella enteritis, sulfonamides for meningococcal).
- (3) If the drug of choice for an identified organism is not known (due to the variability of response to antibiotics on the part of some organisms e.g. staphylococci, coliform bacilli) or if the organism itself is not known but can be isolated from clinical specimens, antibiotic sensitivity tests (see below) are required to determine which of several available antimicrobial agents is likely to have a bacteriostatic or bactericidal effect.

Antibiotic Sensitivity Tests

The principle of the antibiotic sensitivity test is that the organism will be borne below the zone of inhibition.

C P t i s

- 1 H mglobin determinati n and white blood cell count ev ry othe day Differential if WBC is l ss than 8000 Di o tins sulfonamid If gra locyt count is les than 50%
- 2 Daily f esh urine fo pH (use nit a line pap r) a d s dime t Inc ase alkali (sod um m arb nat) if pH is l ss than 7 0 Discontinue d ug if red blood cells ar fo nd i urin (s e above) In rease urine o tput if le s than 1900 cc per day u cry t ll ja oc urs (must be examined for in a f esh specim)
- 3 Daily observ tion of patient fo drug fev r sh j und c nau a vom ting to

Co t ind tion to S Mon m d

- 1 History of p evio s a ve rea tio
- 2 Renal insuff c ency (V ry mall dos s may be us d with ut on)
- 3 Liver damag (Proc d with c tion if ssential)
- 4 H art f il re (If sulfonamid s are ab ol t ly nec ssy b titut pota si m b rbowate fo odium bica bo te a alkalinizing g nt)

AMINOSALICYLIC ACID (PAS)

Aminosalicylid acid (PAS) and it s d m salt h be n found to exe t co id abl tub rcuolostatic ct vity Tber le b cilli r ista t to trept my in may b su eptible to PAS and vic ve s The simulta eou admini trat on of PAS and strept my in d lay the em gen e of strains f t berle ba illa resistant to the latt In addit to th bact riodic eff t antipy eti a tivity is p s nt

PAS i sb o bed e dily f om th gast ointest nal t act F k serum onc ntration a r h d in 30 to 60 min t and minim m lev is a s again rea h d in 4 ho s PAS m y b administ d in t veno sly and subcut eo sly

D s g d Rout of Admini t tion

- A Q l 3 to 4 Gm (45 60 g) as th cid ev y 6 hours
 B I trav n 15 Gm in 3% s lution g e in 2 doses 4 ho ra
 ap t 5 mg of h p rin h ld be added to ach l t r

T xi ty

Na sea vomiti g d rrb drug fev dermatitis ry t l l ia hemst t and hyp p othrombi m m y be obs rved Ga t oint etinal ymptom m y ppa tly be avo d d by pa nt ral admini tratio of sodium PAS

ISONIAZID (INH)

I niaz d (INH) and lated compound po es considerable tber l tatic a tivity Cr s istanc to treptomycin and PAS does not xi t Ba terial esist to INH d v lop rap dly INH is eadily bs bed f om the ga trolite tinal t act and dia trib ted th gh ut the body fluid in l dng the r h o pinal fl id

Oral Sulfonamides Adult and Pediatric Dosage Schedules

Indications & Preparations	Adult Dosage	Pediatric Dosage
Most infections		
Initial dose One of sulfonamide or Isoniazid mixt in an e	2.4 Gm (50-60)	25 mg (1/2 gr) /lb body wt
5 if di ill de H me asin d m thod	0.5 Gm (7 1/2 gr)	5 mg (1/4 gr) /lb wt q 4 H
or 1 1 (Gent 1 m)	1 Gm (15 gr)	mg 1 /lb q 4 H
or am in if di in d if th l	1 Gm (15 gr)	mg 1 /lb q 4 H
5 if di in	1 Gm (15 gr)	10 mg (1/4 gr) /lb q 4 H
r 5 if no in	1 Gm (15 gr)	10 mg (1/4 gr) /lb q 4 H
r 5 if m th y p r id i (Hy x)	1 Gm (15 gr)	10 mg (1/4 gr) /lb daily
if y l i i t On (sulfonamid Isoniazid mixt)	0.5-1 Gm (7 1/2-15 gr)	5-10 mg (1/4-1/2 gr) /lb q 4 H
P ophyl i l pt l and tion On f Isoniazid r Isoniazid mixt	0.5 Gm (7 1/2 gr)	5 mg (1/4 gr) /lb b i d
I t tin l and tio 5 if age nidi e c clyle if th l (S if idin)	50 mg (3/4 gr) /lb St t th 25 mg (3/8 gr) /lb q 4 H	
Lep y d i be l is Gl Isoniazid m (P min)	4 (1 d)	0.5-1 (1/2-3/4 d)
Thi if (P m i o t e)	1.5 Gm (15-20 gr)	10-25 (1/4-1/2 gr) q 4 H
Or lly pt d (if o e l)	1.5 Gm (15-20 gr)	10-25 (1/4-1/2 gr) q 4 H

Toxicity and Management

A T B Long.

- 1 Mild Continue therapy fnecc as ry Symptoms incl de
nausea vomiting headache zinc crystalluria
Modest Stop therapy until continuation is essential to
life Symptoms incl fever ash stomatitis conjun
tivitis rhinitis diarrhea microhematuria psychosi
3 Severe Stop therapy and psh fluids Symptoms incl de
granulocytopenia hemolytic anemia plastic anemia
thrombocytopenia hypotitis exfoliative dermatitis severe
hematuria oliguria leukomoid reaction

B Allergic Reaction A considerable percentage of individuals who have previously received sulfonamides develop more than 7 days become sensitized and may develop immediate and severe reaction on administration. Fever, angioneurotic edema, urticarial and other rash and periarthritis nodosa may occur.

History of previous administration should be obtained. Cross sensitivity to various sulfonamids may exist. Symptoms may be voided by giving a total dose of 0.5 Gm (7 1/2 gr) and observing for 6 hours.

t o y e d A c q u i e d p e n i l l i n r e s i s t a n c e i s n o t c o m m u n l y c o u n t e r e d c l i n i c a l l y

Absorption, Distribution, Excretion

- A Absorption** Penicillin is well absorbed when administered intravenously or intramuscularly and somewhat more slowly absorbed after subcutaneous injection. The peak concentration in the blood is reached immediately after intravenous injection and within one hour after intramuscular injection. Blood levels peak at 2 to 3 hours after doses of 1 to 3 million units intramuscularly and somewhat longer with larger doses. Penicillin procaine suspension is absorbed more slowly than procaine penicillin and is absorbed more slowly when mixed with 2% aluminum monostearate. Benzathine penicillin may produce a more sustained release. With intravenous injection of 600,000 to 1,200,000 units, the blood level is the maximum serum concentration tends to be lower than with aqueous solution and is not proportional to the high serum concentration. Penicillin is absorbed readily from the gastrointestinal tract. Appropriate therapy must be given to produce comparable blood levels. Antacids and buffering agents reduce the digestive effect of gastric juice and absorption is better with an empty stomach. Penicillin is not destroyed by gastric acid. Penicillin is only absorbed from the small intestine and is absorbed from the large intestine. The concentration of penicillin in the body fluids may be measured by various biochemical methods.
- B Distribution** Penicillin is distributed throughout the body fluids but penetrates the joints pleural peritoneum and abscesses and synovial spaces. Penetration is more likely to occur if inflammation exists. Penicillin penetrates into the cerebrospinal fluid and into the placenta and is excreted from the placenta. Organism exposed to penicillin does not multiply for several days after exposure.
- C Excretion** Penicillin is excreted primarily through the urine 80% of the administered dose is excreted and may be partially reabsorbed by the kidney. The excretion is increased by the administration of probenecid (Dose 100 mg) and penicillin (Dose 100 mg).

Preparation

- A Commercially Available Preparations**
1. Cystine penicillin (odium potassium salts)
 2. Penicillin procaine
 3. Penicillin procaine with 2% lidocaine (may be combined with cystine penicillin)
 4. Penicillin tablets with or without benzathine penicillin (50,000 to 200,000 units per tablet) and benzathine penicillin (50,000 units per tablet)
 5. Penicillin V tablets 125 mg of active
 6. Penicillin powder for suspension (50,000 units per 5 g of dry weight)
 7. Penicillin sodium salt (penicillin G) (500,000 units per gram)

Dosage and Routes of Administration

Penicillin G 5 to 10 mg ($\frac{1}{12}$ to $\frac{1}{8}$ gr)/Kg body weight per day in 2 or 3 doses orally. Ten mg ($\frac{1}{8}$ gr)/Kg should be given daily in fulminant meningitis. Sterile solutions may be given intravenously.

Toxicity

Constipation, dysuria, hyperreflexia, postural hypotension and dizziness, eosinophilia, slight anemia, occasional casts and traces of albumin in the urine, reducing substances in the urine.

PENICILLIN

Penicillin is prepared from the cultural products of the molds *Penicillium notatum* and *Penicillium chrysogenum*. The commercially available preparations are crystalline sodium, calcium, potassium, and procaine salts of penicilloic acid.

Many types of penicillin: F, G, Q, V, X, and K are produced by the mold. Commercial penicillin is principally penicillin G (Penicillin X), which occurs only in small amounts, exhibits a slightly different range of antibacterial activity. Penicillin K becomes bound to serum protein and is relatively inactive therapeutically.

The Oxford and International units of penicillin are measured in comparison to the bacterial inhibitory power of a standard penicillin. Crystalline sodium penicillin contains approximately 1500 units per milligram. Dried crystalline penicillin retains its potency indefinitely, but watery solutions may deteriorate especially when not refrigerated.

Indications and Antimicrobial Spectrum (See table, p. 514)

Penicillin exerts bacteriostatic and bactericidal activity against a wide variety of pathogenic agents. The susceptibility of these agents to penicillin may vary considerably. Clinical response of infection may be judged with fair accuracy by means of in vitro sensitivity tests of the infecting organism. The procedure should be performed when expected therapeutic response does not occur or in the case of infections due to organisms such as staphylococci or *Streptococcus fecalis*, many strains of which are naturally resistant to penicillin.

Penicillin is indicated when infection with an organism known to be generally susceptible is diagnosed presumptively. Hemolytic streptococcal infection, not a disease of the pneumococcal pneumonia, not pneumococcal pharyngitis, not a streptococcal pharyngitis. For specific indications see under diseases in question.

Mode of Action, Resistance

Penicillin is both bacteriostatic and bactericidal. Its exact mode of action is not known, but in some way it apparently interferes with the reproductive process of the organism.

Certain organisms produce penicillinase which inhibits penicillin activity. This may occur intracellularly as in the case of *E. coli* and some strains of staphylococci. Susceptible organisms exist; in a lethal concentration of penicillin may be required. The mutants of the organism which we encounter rarely resistant survive and multiply while the susceptible organisms are destroyed.

penicillin dissolved in 10 cc of physiological saline and be administered once a day until the cerebrospinal fluid glucose content becomes normal. Penicillin should also be given intramuscularly.

3. Intrajointal intra-articular. 10,000 to 200,000 units of penicillin may be introduced into joint or pleural spaces infected by susceptible organism daily or every other day following aspiration.

4. Oral. Troch of penicillin may be dissolved slowly in the mouth in the treatment of Vincent's stomatitis and pharyngitis. This form of therapy is valuable in other forms of pharyngitis and may produce stomatitis.

5. Wounds and skin. Solutions of penicillin containing 200,000 units per cc may be used as a wet dressing in infected wounds. Penicillin is of no value as a sterilizing solution because of the necessity of prolonged contact to produce a therapeutic effect.

ointments of penicillin incorporated in various bases may be used on infections of the skin due to susceptible organisms.

Toxicity

Sensitivity of penicillin preparations are almost unknown. Sensitization may be preexisting or induced. Fever and rash especially urticarial may appear during the course of penicillin administration as long as a few weeks later. This may extremely mimic a urticarial reaction. True idiosyncrasy to penicillin is rare and may be largely limited to individual sensitivity of the immune system. Potentially intradermal test to weak penicillin solutions may be used. Do not attempt to treat with penicillin O or pharmaceutical penicillin G which may be substituted for quaternary penicillin except rarely in the same dosage. Cross sensitivity occurs occasionally and should be guarded against.

STREPTOMYCIN

Streptomycin is prepared from the cultivated cells of Streptomyces griseus. Commercially available. It includes the dihydrochloride and the calcium salt. Dihydrochloride may be used alternatively with streptomycin. Vestibular damage is less frequent following dihydrochloride streptomycin than streptomycin. One milligram (1 mg) equals 100,000 units. One Gm equals 1,000,000 Waksman units.

Indication. a. Acute otitis media (See table p. 514.)

Streptomycin is especially useful against gram-negative organisms but possesses significant activity against some gram-positive organisms. Penicillin and streptomycin in combination give the activity in infection due to streptococci. In the treatment of otitis media, streptomycin activity is beneficial.

The indication for streptomycin is limited to infection due to gram-negative organisms and tuberculosis. For this reason, sensitivity should be established before treatment.

E Strength of Solutions and Suspensions

- 1 Crystalline penicillin is generally given in a concentration of 10 000 units per cc but may be much more concentrated
- 2 Penicillin for subarachnoid injection should not be more concentrated than 1000 units per cc
- 3 Penicillin procaine complex in aqueous suspension may be prepared in concentration of 300 000 to 200 000 units per cc

Dosage and Methods of Administration

- A Intermittent Intramuscular. Penicillin in aqueous solution may be given in doses of 5000 to several million units every 3 hours intramuscularly. This remains the method of choice in most severe acute infections. In many infections equally good results may be obtained by administration of 100 000 to 300 000 units every 12 hours intramuscularly. Intramuscular injection of 300 000 to 600 000 units of penicillin procaine may be given every 24 hours. Penicillin procaine in oil with 2% aluminum monostearate produces measurable blood levels which may persist as long as 12 hours. Benzathine penicillin 600 000 to 1 200 000 units produces measurable serum concentrations for one month and is ideally suited to prophylactic use. These preparations are highly satisfactory except in the most severe acute infections.
- B Continuous Intramuscular and Continuous Intravenous. Where very high doses of penicillin are necessarily in the treatment of infections due to resistant organisms administration by continuous drip is often advantageous. Many million units dissolved in 1000 to 2000 cc of physiological saline or 5% glucose solutions may be given by indwelling needle or catheter in 24 hours. The intramuscular site should be changed as frequently as irritation occurs. Thrombophlebitis as a complication of intravenous administration may be avoided by hanging the veins up by addition of 10 mg heparin sodium to the solution.
- C Oral. Penicillin may be given orally in all but the severest of infections or oral medication may be substituted if a parenteral after initial response to treatment. Doses of 100 000 units every 3 hours to 300 000 units every 6 to 8 hours may be given. Penicillin V may be given in a dose of 125 to 250 mg every 6 hours.
- D Topical
- 1 A dose of 50 000 to 100 000 units may be aerosolized from 3 to 8 times a day. A solution containing 50 000 units per 0.5 cc may be nebulized by means of Vapo-phrin® or DeVilbiss No. 40® nebulizers. Forced deep inhalation followed by retention of the inspired penicillin in the gas possible should be insured. Hand pumping or compressed gas fed through a Y tube may be used to nebulize the solution. While local effect in the respiratory passages for the treatment of bronchitis and chronic bronchitis is usually the objective appropriate blood concentrations of penicillin frequently result. Secondary infection occurs commonly.
 - 2 Intrathecal. Although penicillin may penetrate the subarachnoid space after intramuscular injection this phenomenon is inconstant and may be delayed. Therefore in meningitis due to susceptible organisms 10 000 units of

Toxicity

Painful local reactions are uncommon at places of drug rash. If many occur drug fever may be observed and slight nausea and dizziness are frequent. Eosinophilia may be noted but appears to have no significance. Cylindrorhiza and nitroglycerin are not associated with permanent nail damage have been reported. Vestibular damage often manifested first by tinnitus and characterized by severe vertigo and ataxia follows high or prolonged dosage. If streptomycin is discontinued immediately recovery usually follows. If vestibular damage is complete permanent stereociliary compensation is usually made by the patient. Deafness also may occur but it is reversible. Vestibular apparatus dysfunction is less common with dihydrostreptomycin but deafness may develop after treatment has been stopped. The same if combined streptomycin and dihydrostreptomycin in equal parts reduces the incidence of deafness and vestibular damage. Pleurodynia in the case of protein content of the spinal fluid is characteristic of block or myelitis may follow prolonged intrathecal administration of streptomycin.

TETRACYCLINE GROUP (CHLORTETRACYCLINE OXYTETRACYCLINE TETRACYCLINE)

The chemically related drugs are similar antimicrobial spectra and pharmacological properties. Organisms resistant to one drug are usually resistant to the others although significant variations occasionally occur. Generally they are clinically interchangeable.

CHLORTETRACYCLINE (AUREOMYCIN®)

Chlortetracycline (Aureomycin®) is prepared from Streptomyces efavici. It is available as the hydrochloride.

Dosage and Administration (See table on page 514)

Chlortetracycline (Aureomycin®) is an antibiotic of the tetracycline class of antimicrobial agents. It is a broad spectrum antibiotic with a wide therapeutic range. It is active against most gram-negative and gram-positive cocci, the spirochetes of pinta, periodontitis, relapsing fever, relapsing fever, syphilis, and yaws as well as the rickettsiae of typhus, Rocky Mountain spotted fever, scrub typhus, Q fever, and rickettsialpox. It is highly susceptible to the enzyme of penicillinase. Lymphoplasma venereum does not display typical penicillin resistance.

Absorption, Excretion

Chlortetracycline is absorbed slowly from the gastrointestinal tract and peak blood concentrations are reached in from 2 to 4 hours depending on the dose. Following oral administration peak plasma concentration while drops over a period of 6 to 24 hours varying with the dose. Chlortetracycline is poorly absorbed after mucous membrane and subcutaneous administration. Accumulation occurs in the

stituting treatment. Most tubercle bacilli become streptomycin resistant within 3 months of the beginning of treatment although the simultaneous use of PAS or isoniazid may delay this event and one or both should always be used with streptomycin in tuberculosis.

Mode of Action and Resistance

Streptomycin is both bacteriostatic and bactericidal. Its mode of action is unknown. Resistant variants of organisms may multiply quickly in infections treated with streptomycin so that further therapy with the antibiotic is useless. Streptomycin should be used only when necessary and adequate initial dosage should be used to prevent development of drug resistance.

Absorption, Distribution, Excretion

A Absorption. Streptomycin is readily absorbed from the site of intramuscular injection. The peak serum concentration is reached within one hour and detectable amounts are present up to 6 hours later. It is likely that streptomycin persists longer than this in the tissues. If streptomycin is administered every 3 to 4 hours gradually increasing serum levels will be noted due to slow accumulation. Administration every 8 hours is sufficient in all but the most severe infections in which cases the drug should be given initially every 3 or 4 hours. Streptomycin is not absorbed from the gastrointestinal tract but exerts bacteriostatic activity in the lumen of the bowel.

B Distribution. Streptomycin is distributed throughout the body similarly to penicillin. Penetration of the cerebrospinal fluid is inconstant and unreliable.

C Excretion. Streptomycin is excreted principally in the urine where the concentration exceeds that of the serum.

Dosage and Route of Administration

- A Nontuberculous Infections.** 1 to 5 Gm. daily may be given intramuscularly divided doses every 3 to 6 hours. Most acute pneumonias respond to approximately 2 to 4 Gm. per day. Urinary tract infections due to highly susceptible organisms may be treated with 500 mg. intramuscularly every 6 hours for 5 days. Streptomycin should not be used in the presence of obstruction of the urinary tract because of the necroticity of the development of resistant organisms.
- B Meningitis.** Intrathecal intramuscular administration 25 to 50 mg. dissolved in 10 cc. of physiological saline solution may be given intrathecally once daily until the cerebrospinal fluid sugar content becomes normal.
- C Bacillary Dysentery.** Streptomycin may be given orally 0.5 Gm. (7½ gr.) every 6 hours for 5 to 7 days.
- D Tuberculosis.** 0.5 Gm. of streptomycin and 0.5 Gm. of dihydrotetracycline intramuscularly twice weekly is indicated in non-disseminated forms of tuberculosis. In advanced cases of tuberculous pneumonia and millary tuberculosis 40 mg./Kg. of body wt. (20 mg./lb.) daily should be given. In tuberculous meningitis 50 mg./Kg. of body wt. (30 mg./lb.) daily should be administered intramuscularly in addition to 2 mg./Kg. of body wt. (1 mg./lb.) of pyridoxine intrathecally until isoniazid is used simultaneously. (See Tuberculosis Meningitis p. 468.)

C Intramuscular The preparation for I.M. use may be given in a dose of 0.5 mg. every 24 hours or 0.1 Gm. every 6 hours

Toxicity

Nausea vomiting diarrhoea stomatitis and dermatitis occur occasionally. Hepatitis may result from prolonged intravenous treatment at high dosage. Thrombophlebitis may result from intravenous administration. Superinfection with resistant staphylococci may occur usually as a severe enterocolitis. There also occurs with other broad spectrum antibiotics

TETRACYCLINE (ACHROMYCIN® TETRACYN®) POLYCYCLINE® STECLIN® PANMYCIN®)

Tetracycline is produced by removing the chlorine from chlorotetracycline. It is similar to chlorotetracycline and oxytetracycline but is more stable and less than their derivatives

Indication and Antimicrobial Spectrum (See table on p. 314)

Tetracycline is a broad spectrum antibiotic whose field of activity is similar to those of chlorotetracycline and oxytetracycline. Susceptibility of strains of bacteria may differ among the three drugs however

Absorption and Excretion

Tetracycline has a broad excreted similarly to chlorotetracycline. It may diffuse readily into the cerebrospinal fluid. Phosphate buffer glaucan is the most effective

Dosage and Route of Administration

- A Oral 0.25 to 1.0 Gm. every 6 hours
- B Intravenous 0.5 to 1.0 Gm. every 12 hours
- C Intramuscular 0.1 Gm. every 8-12 hours

Toxicity

Similar to that of chlorotetracycline and oxytetracycline but significantly less frequent

CHLORAMPHENICOL (CHLOROMYCETIN®)

Chloramphenicol (Chloromycin®) originally prepared from the epimeric mixture of chloramphenicol produced synthetically

Indication and Antimicrobial Spectrum (See table on p. 314)

Chloramphenicol is a broad spectrum antibiotic with a wide range of activity. It is the vitamin B₁₂ of lymphoid tissue. It is the typical penicillin. Generally speaking it is more effective than chlorotetracycline and oxytetracycline in typhoid fever. It is similar to chlorotetracycline against other gram-negative organisms. It is a broad spectrum antibiotic. Many staphylococci are susceptible to chloramphenicol.

Absorption and Excretion

Chloramphenicol is rapidly absorbed from the gastrointestinal tract

body at high dosage so that blood levels become increasingly elevated during prolonged administration at high dosage. Chlorotetracycline is excreted slowly by the kidney. It does not appear readily in the cerebrospinal fluid or pleural fluid, but it is present in high concentration in the urine and stools.

Dosage

- A Oral 0.25 to 1.0 Gm. may be given orally every 6 hours.
 B Intravenous. Similar results may be obtained by the intravenous administration of 100 mg. every 6 to 8 hours or 500 mg. every 12 hours. In resistant infections combined oral and intravenous therapy may be used.
 C Intramuscular. 250 mg. in 1% procaine solution with 50 units of hyaluronidase added every 6 hours may be substituted for intravenous therapy when required.

Method of Administration

250 mg. orally every 6 hours appears adequate in most acute infections. Gastrointestinal symptoms may be minimized by administering the drug only when food is in the stomach or by simultaneously administering carboxymethylcellulose. Superinfection with yeast in the oropharynx and perineal area may occur but are probably secondary infections of local sensitivity reactions.

Toxicity

Nausea and vomiting are common following oral administration but this may be avoided by reducing the dose to 250 mg. every 6 hours or administering the drug intravenously. Rashes and dermatitis may occur. Loose bowel movements may be observed.

OXYTETRACYCLINE (TERRAMYCIN®)

Oxytetracycline (Terramycin®) is derived from Streptomyces rimosus. The commercial preparations are the hydrochloride and the base.

Indications and Antimicrobial Spectrum (See table on p. 514)

Oxytetracycline is a broad spectrum antibiotic whose range of activity is similar to that of chlorotetracycline. It may be used in infections due to gram positive and gram negative cocci, gram positive and gram negative rods, pleuropneumoniae, tetrads, and the viruses of primary atypical pneumonia, lymphoplasma venereum, and chlamydiosis.

Absorption and Excretion

Oxytetracycline is completely absorbed from the gastrointestinal tract. Satisfactory serum levels may be maintained by administration every 6 hours. Excretion is principally by the kidneys. Significant amounts appear in the bile. Appearance in the cerebrospinal fluid is delayed and irregular.

Dosage and Routes of Administration

- A Oral 0.25 to 1.0 Gm. may be given orally every 6 hours.
 B Intravenous 0.5 to 1.0 Gm. may be administered every 12 hours.
 C Intramuscular Oral therapy should be used whenever possible.

Toxicity

Mild toxic effects occur at dosage level is over 2.5 mg /Kg of body wt /day. Adverse reactions usually variable. Known side effects: drowsiness, tinnitus, numbness of the fingers, difficulty in mastication, numbness of the vision, diplopia and vertigo may occur. Allergic reactions such as skin rash, chills, rashes, sweating, dizziness, edema, erythema, irritation at the site of intramuscular injection are common.

BACITRACIN

Bacitracin is derived from the growth products of *Bacillus subtilis*.

Indication and Administration (See table on p 514)

Bacitracin is a broad spectrum antibiotic. It is a naturally occurring antibiotic. Synergistic action with penicillin and other bactericidal antibiotics has been demonstrated against staphylococci and other organisms. Bacitracin is primarily used topically for local infection and is not systemically absorbed. It is used in the treatment of infection of the skin, eye, ear, nose, throat, and in combination with other antibiotics in the treatment of eye infections. It is also used in the treatment of urinary tract infections. Most staphylococci are susceptible to bacitracin.

Dosage

A Topical Solutions containing 500 units per

B Oral 40,000 to 120,000 units in divided doses daily for 5 to 20 days

C Intramuscular 2500 to 20,000 units every 6 h

Toxicity

Adverse reactions: drowsiness and numbness of the fingers are common. Side effects: drowsiness, tinnitus, numbness of the fingers, difficulty in mastication, numbness of the vision, diplopia and vertigo may occur.

NEOMYCIN

Neomycin is derived from *Actinomyces niger*.

Indication and Administration (See table on p 514)

Neomycin is a potent antibiotic against gram negative bacteria. It is active against many strains of gram positive bacteria, staphylococci, as well as gram positive rods. It is used in the treatment of skin infections, eye infections, ear infections, and in combination with other antibiotics in the treatment of urinary tract infections. It is also used in the treatment of bacterial dysentery. It is used in the treatment of bacterial vaginosis. It is used in the treatment of bacterial prostatitis. It is used in the treatment of bacterial pneumonia. It is used in the treatment of bacterial meningitis. It is used in the treatment of bacterial sepsis. It is used in the treatment of bacterial endocarditis. It is used in the treatment of bacterial osteomyelitis. It is used in the treatment of bacterial arthritis. It is used in the treatment of bacterial cellulitis. It is used in the treatment of bacterial abscesses. It is used in the treatment of bacterial empyema. It is used in the treatment of bacterial pyomyositis. It is used in the treatment of bacterial myositis. It is used in the treatment of bacterial fasciitis. It is used in the treatment of bacterial necrotizing fasciitis. It is used in the treatment of bacterial gangrene. It is used in the treatment of bacterial osteomyelitis. It is used in the treatment of bacterial arthritis. It is used in the treatment of bacterial cellulitis. It is used in the treatment of bacterial abscesses. It is used in the treatment of bacterial empyema. It is used in the treatment of bacterial pyomyositis. It is used in the treatment of bacterial myositis. It is used in the treatment of bacterial fasciitis. It is used in the treatment of bacterial necrotizing fasciitis. It is used in the treatment of bacterial gangrene.

Administration and Effect

Neomycin is orally absorbed. It is absorbed in the small intestine. It is primarily active in the lumen of the bowel when given orally. It is not absorbed into the systemic circulation.

510 Polymyxin

tract reaching a peak serum concentration within 2 hours. Absorption following rectal administration is slightly less efficient. 0.5 Gm. may be administered intramuscularly or intravenously every 6 hours. Excretion is principally by the kidneys and high concentrations are reached in the urine.

Dosage and Routes of Administration

- A Oral Adult 0.5 Gm. every 6 hours children 40 mg./Kg./day
- B Rectal 125 to 150 mg./kg. (56 to 70 mg./lb.) per day in children every 6 hours. Capsule should be punctured before insertion
- C Intramuscular and Intravenous 500 mg. every 6 hours

Toxicity

Nausea and vomiting, diarrhea, nervous depression, dermatitis, granulocytopenia and aplastic anemia occur occasionally. Therefore, chloramphenicol should be used only on definite indication.

TYROTHRICIN

Tyrothricin is prepared from *Bacillus brevis*. It is used topically as an ointment or watery suspension. It is active only against gram positive organisms. Because of toxic effects on parenteral administration, its use is limited entirely to the topical treatment of infected wounds and pyoderma.

POLYMYXIN (AEROSPORIN®)

The polymyxins of which B, D and E have been given clinical trial are derived from *Bacillus polymyxa* and related organisms.

Indication and Antimicrobial Spectrum (See table on p. 514)

With the exception of most strains of *Proteus vulgaris*, polymyxin is bactericidal against gram negative rods and most strains of *Pseudomonas aeruginosa* (pyocyanase). Polymyxin is indicated in severe systemic infections due to gram negative rods particularly infections due to *Pseudomonas aeruginosa* which do not respond to other forms of chemotherapy. It may be used as a local application in wounds infected with susceptible organisms. It may be given orally in the treatment of the sigmoiditis associated with

Absorption and Excretion

Absorption is rapid following intramuscular injection. Excretion is largely by the kidney and high concentrations are achieved in the urine. Polymyxin is not absorbed from the gastrointestinal tract and when it is given by mouth it exerts its principal activity in the lumen of the bowel.

Dosage

- A Intramuscular 1.5 to 2.5 mg./Kg. of body wt. divided 4 to 6 or 4 doses
- B Oral 20 mg./Kg. of body wt./day given in 3 or 4 doses

tissues in man and bacteremia do not exist. Toxic reactions include gastrointestinal irritation and occasional skin rashes.

Dose Adults 100 mg orally 4 times daily. Children 5 to 8 mg /Kg /day. An intravenous preparation is now available but its safety and efficacy are not yet known.

VIOMYCIN (VINACTANE® VIOCIN®)

Viomycin is derived from Streptomyces purpureus. It is active only against Mycobacterium tuberculosis in including strain resistance to streptomycin, aminosalicylic acid and isoniazid. Because it is highly nephrotoxic and neurotoxic, its use is very limited. Toxic reaction includes eighth nerve damage and renal insufficiency with distal tubule electrolyte balance.

Dose 2 Gm intramuscularly every third day.

NYSTATIN (MYCOSTATIN®)

Nystatin is derived from Streptomyces noursei. It is active against a wide variety of fungi and yeast and is very poorly absorbed from the gastrointestinal tract so that its activity is principally within the lumen of the bowel. When we applied locally, superinfection with yeasts caused by tetracycline therapy may be reduced by oral administration of nystatin. It may be used locally in antifungal skin infections.

Dose Orally 500,000 units 3 times daily. Locally as vaginal suppositories (100,000 units) once or twice daily or as cream (100,000 units /Gm).

NOVOBIOCIN (ALBAMYCIN® CATHOMYCIN®)

Novobiocin is derived from Streptomyces novaeboracensis. It is a broad spectrum antibiotic which however is biologically incompatible. It is readily absorbed from the gastrointestinal tract and achieves very high concentrations in the serum but it is largely bound to serum protein.

Novobiocin is fully effective against staphylococcal infections as well as other infections such as those caused by many other bacteria and E. coli.

Novobiocin is given orally in capsules. Renal excretion may be impaired.

Dose 0.25 to 0.50 Gm orally 4 times daily.

OLEANDOMYCIN (MATROMYCIN®)

Oleandomycin is a broad spectrum antibiotic derived from Streptomyces antibioticus. Synergism in combination of oleandomycin with streptomycin. Excellent oral activity has not been established.

Dose 0.25 Gm orally 4 times daily.

512 Nitrofurantoin

mycin is principally excreted by the kidney and appears in the urine in high concentration

Dosage

- A Topical Ointments containing 1000 units per gram or solutions contain g 200 units per cc may be used locally
- B Oral 0.1 Gm /Kg daily divided into 4-5 doses
- C Intramuscular 15-20 mg /Kg daily divided into 4 doses

Toxicity

Renal damage manifested by albuminuria. Nephrogenic retinopathy may occur. Deafness may follow parenteral administration

ERYTHROMYCIN (ERYTHROCIN® ILOTYCIN®)

Erythromycin is a medium spectrum antibiotic derived from *Streptomyces erythreus*. Its action may be bactericidal or bacteriostatic depending on the susceptibility of the bacteria. Resistance to erythromycin may develop rapidly under certain circumstances most notably by staphylococci. For this reason erythromycin should not be used alone in serious staphylococcal infections.

Indications and Antimicrobial Spectrum (See table on p. 514)

Erythromycin is active against most strains of gram positive cocci, gram negative cocci, *C. diphtheriae*, *H. influenzae*, *H. pertussis* and *B. illae*. Activity has also been shown against the viruses of lymphopathia venereum and psittacosis and the rickettsias of typhus. Erythromycin may be indicated in infections due to these organisms as an alternative to penicillin and other antibiotics.

Route of Administration and Dosage

- A Oral 0.2 to 0.5 Gm every 6 hours
- B Intravenous 0.5 Gm every 12 hours

Toxicity

Nausea, vomiting and diarrhoea occur occasionally.

FUMAGILLIN (FUMIDIL®)

Fumagillin is derived from *Aspergillus fumigatus* H 3. It is directly amebicidal and apparently is effective also against other enteric protozoa. It has been valuable in the treatment of drug-resistant amebiasis. Dosage 30 to 60 mg orally daily for 10 days.

NITROFURANTOIN (FURADANTIN®)

Nitrofurantoin is active against a wide variety of bacteria, both gram positive and gram negative. It is readily absorbed from the gastrointestinal tract and excreted in high concentration in the urine. Serum and tissue concentrations are insignificant. It is useful in the treatment of infection of the urinary tract when significant

Chapter 21

DISEASES OF UNKNOWN ETIOLOGY

A variety of names (colligandis) are diffusely used, but have been given to a group of diseases which appear to have in common a pathologic involvement of the connective tissues. The most frequent rheumatoid arthritis, disseminated lupus erythematosus, periarteritis nodosa, and scleroderma, dermatomyositis, and scleroderma (sclerosis) and perhaps glomerulonephritis are the chief members of this group of rather ill-defined but probably related diseases of unknown etiology. The differentiation of these disorders is sometimes possible on clinical grounds, and in many instances the diagnosis can be established only after long and painstaking observation (see page 520). There is some evidence that hypersensitivity is common to many of the etiologies although the pathological action in these cannot yet be probably ascribed by a wide variety of injurious agents.

Clinical Findings

Certain clinical features are common to many of the colligand diseases although they may be considered individually in their relation to the clinical picture and frequency of manifestation.

A Clinical Lesions B Systemic C Joint D Cardiovascular E Vascular F Immunological G Systemic H Systemic I Systemic J Systemic

1 Rheumatoid 2 Purpuric 3 Hemorrhagic

C Arthritis D Synovitis E Thrombocytopenia

D Cardiovascular E Cardiac F Cardiac G Cardiac H Cardiac I Cardiac J Cardiac

E Vascular F Arteriosclerosis G Arteriosclerosis H Arteriosclerosis I Arteriosclerosis J Arteriosclerosis

1 Lymphatic 2 Lymphatic 3 Lymphatic 4 Lymphatic 5 Lymphatic 6 Lymphatic 7 Lymphatic 8 Lymphatic 9 Lymphatic 10 Lymphatic

G Systemic H Systemic I Systemic J Systemic

1 Systemic 2 Systemic 3 Systemic 4 Systemic 5 Systemic 6 Systemic 7 Systemic 8 Systemic 9 Systemic 10 Systemic

I Systemic J Systemic

J Systemic

1 Systemic 2 Systemic 3 Systemic 4 Systemic 5 Systemic 6 Systemic 7 Systemic 8 Systemic 9 Systemic 10 Systemic

Laboratory Findings

The following are of special diagnostic significance:

A Skid B Skid C Skid D Skid E Skid F Skid G Skid H Skid I Skid J Skid

B Skid C Skid D Skid E Skid F Skid G Skid H Skid I Skid J Skid

C Lupus D Lupus E Lupus F Lupus G Lupus H Lupus I Lupus J Lupus

ANTIMICROBIAL SPECTRA OF CHEMOTHERAPEUTIC AGENTS

Data re b incipally be d on availabl ling i spe t nc and i l xies or
in lro to t The d g of hol li ed way b pplanted furth xperase
m list

**	D 2 of hot	O N Ignit	u i y	(S)	S M	(P and
	Alt react d g	V Signif an variat	in		I	P min ¹
	1 V k tiv y	an pibitly of	in			El on ²
	facor i i da	P W data variabl		C	Combined th rap	

Organism	Disease	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence	Prevalence	Incidence
<i>S. h. m. lyti</i> ()	<i>S. pp. lon</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>St. vi. ida</i> (++)	<i>S. pp. ration</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>S. f. li</i> (++)	<i>S. po. i</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Staph. ()</i>	<i>S. pp. i</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>S. ph. lh</i> (++)	<i>S. pp. ti</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>St. pn. moni</i> (++)	<i>P. um. sec. i</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Clostridium g. p. (++)</i>	<i>T. la. ad. ga</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>C. diph. he. i</i> (++)	<i>Diphthe. la</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>B. th. i</i> (++)	<i>Anth. (Ra.)</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>B. subtilis</i> (++)	<i>(Ra.)</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>N. g. ha. f. i</i> ()	<i>C. h. b</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>N. m. ni. gi. li. di</i> ()	<i>M. ni. gi. li. di</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>H. infl. i</i> ()	<i>infl. i</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>H. pe. i</i> ()	<i>Wh. pl. g. gh</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>K. d. y. i</i> ()	<i>Ch. id</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>K. m. um. on. i</i> ()	<i>F. i. di. a. d</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>E. h. (B.) i</i> ()	<i>S. pp.</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>A. roge</i> ()	<i>S. pp.</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>P. ulgar. i</i> ()	<i>S. pp. ti</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>P. g. an</i> ()	<i>S. pp. i</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>S. typhi</i> ()	<i>Typh. id. i</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Salmon. lla. g. p. ()</i>	<i>P. re. typh. id</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Shig. lla. dy</i> ()	<i>Sh. lla. y</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>gro. p. ()</i>	<i>dy</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>P. ula. i</i> ()	<i>T. i. rem. ia</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>P. i. p. u. i</i> ()	<i>Plagu</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>B. lla. group</i> ()	<i>U. d. i. f</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>B. f. d. lla. mi</i> ()	<i>S. pp. son</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>B. m. Ba. lla. mon. i. f. ren. i</i> ()	<i>Ha. hili. f</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>A. bovi</i> (++)	<i>A. inon</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>E. y. pel. thia</i>	<i>E. y. pel. d</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>hustops. lla</i> (++)		++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>T. p. lla. m</i>	<i>Syphili</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>T. m</i>	<i>T. m</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Bo. ti</i> ()	<i>R. lep. gf</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Spi. lli. m. ni</i> ()	<i>Re. bi. f</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Lep. p. ra. i</i>	<i>W. T. di</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>h. m. hagi</i>		++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>m. ub. culos</i> (++)	<i>T. be. nlos</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>My. i. p</i> ()	<i>Lepro. y</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>P. i. l. i. e</i>	<i>P. i. a. os</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Lymph. pathia</i>	<i>Lymphop. athia</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>um. i</i>	<i>m</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>P. lna. y. typh.</i>	<i>P. in. yph. i</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>pneum. nia. i</i>	<i>p. m. ia</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Donova. body</i>	<i>Granulom. inguinal</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>Ri. k. tala</i> ()	<i>Typh. ad. pot. d. sev</i>	++	++	++	++	++	++	++	++	++	++	++	++	++	++
<i>(i. tire. gr. P)</i>		++	++	++	++	++	++	++	++	++	++	++	++	++	++

$$\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} \frac{1}{1 + \epsilon^2} e^{-\frac{1}{2}\epsilon^2} d\epsilon$$

a Sodium Salicylate H E P is most widely used

(1) Dose 1-2 Gm (15-30 g) very 2-4 hours or 1ly
The drug should be given in sufficient doses to allay symptoms and fever and it may be necessary to give maximum dose to achieve this result. In an occasional patient maximum doses may not be completely effective. There is no evidence that intravenous administration has any advantages over the oral route.

(2) Toxic reactions: The early reactions include tinnitus, nausea and vomiting. Sodium salicylate may be given in enteric coated 0.5 Gm (7½ gr) pills or with equal doses of sodium bicarbonate to reduce gastric irritation. Never use sodium salicylate or sodium bicarbonate in patients with acute rheumatic fever who have associated cardiac failure.

b Acetylsalicylic Acid U S P may be substituted for sodium salicylate with the same dosages and precautions.

c Aminopyrine N P (Pyramido®) If the salicylate is not tolerated this drug may be used in doses of 0.2-0.4 Gm (3-6 gr) every 3-4 hours. Check the WBC very 2-4 days when giving this drug.

2 The sulfonamides and penicillin should never be used in the treatment of acute rheumatic fever; they are of no value and the sulfonamides may be harmful.

Prevention of relapse - There is some evidence that penicillin may prevent a relapse if used within 12-24 hours after the onset of a streptococcal infection.

b Coxington infection: If an acute infection occurs during an attack of rheumatic fever, give antibiotic agents indicated (see page 514) but avoid giving sulfonamides.

B C ral Measures

1 Bed rest should be enforced until all signs of active rheumatism have disappeared. The secret for this is:

a Return of the temperature to normal with patient at bed rest and without medication.

b Normal mentation rate.

c Normal resting pulse rate (under 100 in adults).

d Return of ECG to normal; fixation of abnormality.

2 Gradual resumption of activities: Patient may be allowed up slowly but several months should elapse before return to full activity unless the infection was exceedingly mild.

3 Maintaining good nutrition.

C Corticotropin (ACTH) and the Corticoids: Although rather remarkable results have been observed in acute rheumatism in patients treated with these drugs, which improve results only temporarily. The myocardial pericarditis, effusions, pleuritis, and polyarthritides. Abnormal ECG changes (prolonged P-R interval) and blood sedimentation rate may return to normal limits within a week. Optimal dosage and influence of the drugs on the development of subsequent cardiac lesions have not been established (See page 423).

D Treatment of Complications

1 Congestive failure: Treat as for congestive failure (see page 162) with the following cautions:

polymorphonuclear leukocytes (with round vacuole partially filled with nuclear material) in marrow and peripheral blood smears suggest disseminated lupus

- Antistreptolysin Titer Demonstration of changing A S titer may provide etiologic information regarding background of previous streptococcal infection which is of especial value in the diagnosis of rheumatic fever

- E E reactive Protein (CRP) The test for this abnormal serum protein is said to provide a sensitive index of inflammatory activity

Rheumatic fever and Sydenham's chorea will be discussed individually. The treatment of other diffuse collagen diseases will be discussed collectively. Acrocyanosis (acrosclerosis) has been included in this group for purposes of differential diagnosis although it is doubtful that it is a true member of the collagen disease group. Rheumatoid arthritis has been dealt with in Chapter 12 (see page 311) glomerulonephritis in Chapter 11 (see page 293)

RHEUMATIC FEVER (code No 010 932)

A generalized disease of unknown etiology usually coming on 1-3 weeks after an acute infection with the hemolytic streptococci and manifested usually by pathological changes involving the heart, blood vessels and serous surfaces primarily the joints. It has a marked tendency to recur.

Diagnosis

The diagnosis of active rheumatic fever can usually be made if the patient has 2 or more for manifestations or 1 major and 2 minor manifestations of the disease (Jones)

A Major Manifestations

- | | |
|--|--------------------------|
| 1 Definite pathologic of rheumatic fever | 3 Inflammation of joints |
| 2 Signs of active carditis (including ECG changes) | 4 Subcutaneous nodules |
| | 5 Chorea |

B Minor Manifestation

- | | |
|-----------------------|------------------------------------|
| 1 Fever | 5 Non-traumatic subcutaneous edema |
| 2 Erythema marginatum | 6 Purpura |
| 3 Abdominal pain | 7 Pneumonitis |
| 4 Pre-ordial pain | |

- C Laboratory Tests May show increased sedimentation rate, increased antistreptolysin titer, C reactive protein, leukocytosis and anemia and abnormal ECG

Treatment (See page 187 for treatment of rheumatic disease)

A Salicylic Mosaic

- 1 Salicylate therapy The salicylate markedly reduces fever, all-viate joint pain and possibly reduce joint swelling. There is no evidence that they have any effect on the natural course of the disease. The salicylates should be continued as long as necessary to relieve pain, swelling or fever. If withdrawal of the drug results in a recurrence of symptoms they should immediately be reinstituted.

more latitude of action rheumatologic. If this proves to be prompt and efficient treatment of any pyogenic infection, it is acceptable individual may be adequate prophylaxis.

CHOREA (Sydenham's) (code No 930 190)

A less common manifestation of rheumatic disease characteristically by generalized edema and congestion of the base and by involvement of the basal ganglia with vascular thrombosis, hemorrhage, perivascular infiltration and karyolysis of the cells. It occurs most frequently in females in the second decade and is characterized by jerky restlessness, effeminate mannerisms and tics by dysarthria.

Treatment

- A Spinal Muscles Nephew Corticotropin (ACTH) and the response to be followed in many cases of the. It must be given relatively high initial dosage and marked sedation must be employed.
- B Fever may be employed if all else fails. This may be achieved by the use of 2 methods. Hypothalamic approach with temperature 38.5-40.5°C (103-103°F) for 3-5 hours twice weekly for 30 treatment. typhoid fever is 1 V daily for 5-7 days.
- C General Measures
 1. General symptomatic measures and good nursing. If most important.
 2. Sedation with Phorbital USP 15-30 mg (1/4-1/2 g) tid qid may be helpful.
 3. If value is appropriate. Mg. Sulfate USP 4-10 g (1 1/2 dr) of 10% solution I.M. or I.V. may be used. When administered 1 g magnesium intravenously has a synergistic effect with 10% f 107 but not of the glenitoidothelium. It is easy to administer I.V. if necessary either or separately.

OTHER DISEASES OF UNKNOWN ETIOLOGY OTHER VISCERAL ANGIOTIDES (Diffuse Vascular Diseases)

- Acrocytosis (code No 930 518)
 Diffuse scleroderma (code No 114 871)
 Disseminated lupus erythematosus (code No 110 0) Distal
 ganglioneuroma on the distal peripheral
 Dermatomyositis (code No 24 100)
 Pelegrini's disease (code No 460 180)

Dose

See label on page 520

Treatment

- A Spinal Muscles Nephew Supportive treatment with the use of (ACTH) the effect on the may give some benefit although the value is variable. I must be the effect of quite different doses to produce the effect of

- a Low sodium diet (see page 55) and mercurial diuretics (see page 204) are of particular value in promoting diuresis and treating failure in acute rheumatic fever
 - b Digitalis is generally not as effective in acute rheumatic fever as in most cases of congestive failure and the drug may accentuate the myocardial irritability producing arrhythmias that further embarrass the heart
 - c Many cases of congestive failure are due to acute myocarditis. These cases often respond dramatically to corticotropin (ACTH) or the corticosteroids. When these agents are used for this condition maximal sodium restriction (under 200 mg daily) is imperative
- 2 Pericarditis. Treat as any acute non-purulent pericarditis (see page 188). The rheumatic effusion is sterile and antibiotics are of no value. The general principles include relief of pain by opiates if necessary and removal of fluid by cardiac paracentesis if tamponade develops. If paracentesis is performed it should be preceded and followed by a short course of penicillin therapy to prevent contamination of the pericardium. ACTH and corticosteroids as well as salicylates should be continued or started as they seem to have a specific and favorable effect in aiding resorption of the fluid.

Prophylaxis

The principles of prophylaxis are to avoid hemolytic streptococcal infection and to give immediate treatment with the antibiotic of choice if a streptococcal infection occurs.

A General Measures

- 1 Avoid contact with persons who have colds or upper respiratory infections
- 2 If possible live in a warm climate

B Prevention of Infection. Two methods of prophylaxis are now advocated

- 1 Penicillin. One penicillin in doses of 200,000-250,000 units every day before breakfast. Benathine Penicillin G U.S.P. (Bicillin®) 1,200,000 units 1 time a month. This is indicated especially for children who have had one or more acute rheumatic fever attacks and should be given throughout the school year. Adults should receive this for about 5 years after a first attack of acute rheumatic fever. In any case it should be given to these individuals between September and June.
- 2 Hydramin. If penicillin is not available give hydramin 0.5-1.0 Gm (7½-15 gr) daily throughout the year. Patients receiving sulfonamides should have frequent blood counts; urinalysis should be performed initially and at least every 4-6 weeks thereafter. If there is any tendency towards leukopenia the drug should be stopped immediately.

- C Treatment of streptococcal sore throats should be initiated by one of the antibiotics. It has been shown that prompt therapy (within 24 hours) of streptococcal infection by 500,000-900,000 units of Benathine Penicillin G U.S.P. (Bicillin®) I.M. or 300,000-600,000 units procaine penicillin with aluminum monostearate in oil I.M. every third day for 3-11 days will prevent

the illness. Other patients have received temporary benefit during acute episode. A few patients seem to be only deliriously affected by disease agents. Suggested dosages schedules are comparable to those employed in rheumatoid arthritis (see page 318).

■ General Measures

- 1 Diet: High caloric, high vitamin diet
- 2 Blood transfusions may be used if anemia is present. Iron salts may also be tried but are usually ineffective (page 318).
- 3 Protect against exposure to sunlight or other strong light (Disminished lupus erythematosus and dermatomyositis).
- 4 Protect against exposure to cold (Scleroderma with Raynaud's phenomenon, see page 210).
- 5 Protect against secondary infections. During the acute febrile phases of diminished lupus erythematosus and dermatomyositis and periarthritis nodosa, the administration of penicillin or other antibiotics may help to prevent secondary infection, especially to pneumonia organisms.
- 6 Physical therapy measures may be indicated in the management of joint and periarticular manifestations (see page 323).
- 7 Salicylates and other analgesics may be employed properly.
- 8 Proper care of skin is indicated. Steroidlike topical ointments may be beneficial in eczematoid form (see page 106). For areas free of lupus erythematosus, see page 83.
- 9 If renal insufficiency is present treat according to general principles on page 300.

P prognosis

Diminished lupus erythematosus and periarthritis nodosa usually run a mild downhill course with a fatal outcome in 2 years. Corticosteroids or cortisone therapy appears to prolong life in a few patients. Relapses and remissions occur frequently in dermatomyositis and 50% of patients eventually die spontaneously. Scleroderma is slowly progressive and debilitating. Acrocyanosis has a better prognosis than diffuse scleroderma.

FROSTBITE (code No 0 -448)

Frostbit is injury of the superficial tissues due to freezing it may be divided into three grades of severity

1st degree Freezing without blistering or peeling

2nd degree Freezing with blistering or peeling

3rd degree Freezing with death of skin and/or dermis

In mild cases there is numbness, pricking and itching. With increasing severity there may be paraesthesiae and stiffness. Duration of the pain is present. The skin is white or yellowish and the tissues stiffen and immobility. Edema, blisters, necrosis and gangrene may appear.

Treatment

There has not been sufficient clinical experience to conclusively evaluate treatment methods. It is difficult to determine the duration of degree of exposure and treatment as easy as the extent and severity of injury when the patient is first seen.

A Immediate Treatment

- 1 Rewarming. The matter of rewarming is controversial since patients are seldom seen while the freezing is continuing. Current methods of rewarming are to slow rewarming but recent experiments show that rewarming rapidly with warm water is slightly above body temperature may result in significant dermal necrosis. Rewarming with hot water is best accomplished by immersion of the extremity in water heated to but not more than 108°F (43°C). After thawing has occurred and the patient is returned to normal temperature, external heat should be removed.
- 2 Protection of the local part
 - a Avoid liposuction, massage, pressure or friction. Avoid physical therapy in the early stage.
 - b Keep the part with flannel to let it dry. Avoid direct contact with bed linen, blankets and clothing.
 - c Avoid exposure to sun, wind, cold and get handbags and local protection may be tried with mild ointment without airtight protective agents.
 - d Erythema, pain, blisters, tenderness are probably unavoidable. If ulceration has occurred, apply anti-tetanus treatment is suggested.
 - e Anticoagulants. The value of anticoagulants is controversial. The treatment is to be valuable it must be instituted within 2 days after the wounding. Rapidly acting heparin (see page 215 for dosage) is administered to maintain continuous prolongation of the clotting time for a period of about 2 weeks. This may be useful in preventing and with minor in surrounding areas.
 - f Vasodilators. These agents have not proved to be particularly valuable.

B Follow up Care

- 1 Mild degree. If physical therapy is important, the healing process occurs.
- 2 Moderate degree. It may be indicated when the patient is discharged (page 400).

Chapter 22

DISEASES DUE TO PHYSICAL AGENTS

DISORDERS DUE TO COLD

Exposure to cold produces immediate localized vasoconstriction followed by generalized vasoconstriction. When the skin temperature falls to 25 C (77 F) tissue metabolism is slowed but the demand for oxygen remains greater than the slowed circulation can supply and the area becomes cyanotic. At 15 C (59 F) tissue metabolism is markedly decreased and the dissociation of myoglobin is reduced giving a pink well oxygenated appearance to the skin. Evidence indicates that tissue survival at this temperature is slight. Tissue death may be caused either by ischemia and thrombooses in the smaller vessels or by actual freezing with the formation of ice in the tissues. Freezing does not occur until the skin temperature drops to -4 to -10 C (25 to 14 F) or even lower depending on coexisting factors such as wind, immobility, venous stasis, malnutrition and occlusive footwear.

Prophylaxis

1. Wear warm dry clothing preferably several layers to afford additional insulation with windproof outer garment.
2. Keep dry when possible; remove wet clothing as quickly as possible and replace with thoroughly dried ones.
3. Avoid cramped positions, constricting clothing and prolonged dependency of feet.
4. Exercise arms, legs including fingers and toes periodically to maintain circulation.
5. Avoid wet and muddy ground and keep sheltered from wind.
6. Maintain good nutrition and cleanliness of skin.

CHILBLAINS (code No. 0 448)

Chilblains are red itching skin lesions usually on the extremities caused by exposure to cold without actual freezing of the tissues. They may be associated with dermatoblastoma and are aggravated by the application of warmth. In the chronic form ulcerative or hemorrhagic lesions may appear and progress to scarring, fibrosis and atrophy.

Treatment

1. Protect affected area from trauma and secondary infection.
2. Do not rub or massage injured tissue or apply direct heat.
3. Elevate affected part slightly and allow to warm gradually.

Prophylaxis

- 1 Avoid unnecessary exposure to heat
- 2 Maintain adequate fluid and salt intake using 0.1% saline as drinking water or salt tablets and water
- 3 Increase activity slowly until acclimatized
- 4 Wear loose fitting clothing (preferably white) which is permeable to moisture
- 5 Avoid alcoholic indulgence excessive fatigue loss of sleep or intercurrent infections. Maintain good nutrition

HEAT STROKE (Sunstroke) (code No 010-453)

Heat stroke is a rare disorder due to exposure to high temperatures which is characterized by sudden loss of consciousness and by failure of the heat regulating mechanism as manifested by hyperpyrexia and cessation of sweating. There may be premonitory headache, dizziness, nausea, and visual disturbances. The skin is hot, flushed, and dry and the pulse is rapid, irregular and weak. The rectal temperature may be as high as 105-112 F (42-44 C). Hydration and salt content of the body are normal.

Treatment

Aimed to reducing high temperature

A Emergency Measures

- 1 Place patient in a shady cool place and remove clothing
- 2 Cool patient by fanning and sprinkling with water
- 3 Immerse in cold water or ice packs or give water enemas to reduce body temperature. Do not lower body temperature below 102 F (39 C) too rapidly
- 4 Massage extremities to maintain circulation
- 5 Avoid sedation since this further disturbs the heat regulating mechanism and precipitates convulsions
- 6 Physiological saline 1000 cc (1 qt) I.V. very slowly
- 7 **Follow up** Avoid immediate re-exposure to heat. Hyperactivity to high temperature may remain for a considerable time

HEAT EXHAUSTION (Heat Prostration) (code no 010-445)

Heat exhaustion is due to inadequate or collapse of the peripheral circulation secondary to salt depletion and dehydration following sustained exposure to heat. The symptoms include weakness, dizziness, stupor, headache with or without muscular cramps. The skin is cool and pale and there is profuse perspiration, oliguria, tachycardia, with occasional mental confusion and muscular incoordination. Laboratory tests reveal hemoconcentration and salt depletion.

Treatment**A Emergency Measures**

- 1 Place patient at shade in cool shady place
- 2 Evaluate treatment measures given
- 3 Sodium chloride 0.1% solution, by mouth or physiological saline 1000-2000 cc (1-2 qt) I.V.

524 Heat

- **Surgery** Surgical amputation should not be considered until it is clearly established that one is dealing with non viable tissue. Tissue necrosis even with black eschar may actually be quite superficial and there may be viable skin underneath which may heal well.

Prophylaxis

See General Section on page 522

IMMERSION FOOT (Trench Foot) (code No 096-44x)

Immersion foot is caused by prolonged immersion in cool or cold water or mud and is characterized by cold anesthetic extremities which become hot with intense burning and shooting pains during the hyperemic period. The affected extremities may be pale or cyanotic with diminished pulsations during vasospastic period followed by blistering swelling redness heat ecchymoses hemorrhage or gangrene and secondary complications such as lymphangitis cellulitis thrombophlebitis.

Treatment

Be instituted during stage of reactive hyperemia

A Early Treatment

- 1 Protect extremities from trauma and secondary infection. Do not rub or massage feet or legs or apply ice or heat.
- 2 Keep feet elevated to aid in removing edema fluid.
- 3 Protect pressure sites (e.g. heels) by use of pillows.
- 4 Warm extremities gradually by exposure to cool air. Do not moisten skin or immerse in water.
- 5 Bed rest early and until all ulcers have healed.
- 6 Penicillin should be used if infection develops (see page 502).

B Aftercare Treat as for Buerger's disease (see page 209)

Prophylaxis

See General Section on page 522

DISORDERS DUE TO HEAT

Exposure to heat results in prompt vasodilatation increased cutaneous circulation increased cardiac output and sweating. The resultant circulatory instability may lead to syncope in the erect position but muscular activity usually prevents this syncope. Fluid loss through sweating may amount to 3 or 4 liters per hour with heavy work at high temperatures. The salt content of sweat increases with rising temperatures ranging between 0.2 and 0.5%. Acclimatization usually results after 8 to 10 days of exposure to high temperatures but even a fully acclimatized individual may suffer a breakdown in the event of excessive fatigue intense exertion infection alcohol indulgence loss of sleep or failure to maintain hydration salt intake or caloric intake. Breakdown may be due to inadequacy of the circulation (circulatory failure) or to a failure of the sweating mechanism. Cessation of sweating is a very important sign and may indicate impending stroke or collapse.

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may b us d to r move g se ol
Remov o ly too nd n roti t ue If n ess y to
ope blister do so sept liv

d Do not apply tannic acid silver nitrate or sulfonamide powders to burned area.

2 P e r d ing (May 1961 at 1.4 per cent)

a C r w t h e t r i l p e t r o l t m r r m i l g u s t i n a

b Apply g e n d d f f f d p o s s e

Band g snugly wth oil bandag d over wth otto
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d Apply p es u e mu l t i k i e t t l a t i b a n d g e a
 m e a s t 10 14 d y P r p e f s k i g a f t

3 Op i t t m n t i b i g u e d g a b u t h p r s e
d r e s s g t h e m s t m m o l y m p l y d f o r m f t h a p p

C G I M R

1 P 1111M If inf t on i a p cted (P 502)

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ELECTRIC SHOCK (code No. 01D-460)

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4 Treat shock when present (see pag 28)

- Follow up Avoid immediate re exposure to heat

HEAT CRAMPS (code No 270 445)

Heat cramps are painful spasms of voluntary muscles of abdomen and extremities due primarily to salt depletion and following sustained exposure to heat. The skin is moist and cool and muscle twitchings may be present. The temperature is normal or only slightly increased. Laboratory studies reveal hyponatremia and low serum sodium.

Treatment

A Emergency Measures

1 Sodium chloride (tablets) 1 Gm (15 grains) every 1/2 hour with abundant of water or saline solution by mouth or 1000 cc (1 qt) physiologic saline I.V. This usually relieves attack promptly.

2 Have patient rest in a cool shaded place.

3 Massage the muscles gently.

B Follow up Rest for 1-3 days depending on severity.

BURNS

Burns are tissue injuries due to heat and may be graded as follows:

1st deg Erythema without blistering (code No 13 4411)

2nd deg Erythema with blistering (code No 13 4412)

3rd deg Destruction of deep tissues (code No 13 4412)

When tissue is burned plasma is lost into the burned area and from the surface of the burn. This leads to hypoproteinemia which causes swelling as a granululating surface appears and the granulating surface heals poorly as long as the plasma hypoproteinemia. The loss of plasma results in a reduced blood volume, hemoconcentration, low renal output, decreased blood flow, oliguria, elevated BUN and leukocytosis. Though anemia may occur at the time of the burn due to red blood cell destruction it is more commonly becoming apparent about the fifth day after the burn. The effects of blood destruction and impaired blood formation make themselves apparent. Secondary infection is prone to occur and must be treated promptly. Although myoglobinuria is present in about 30% of the body surface involved in a first degree burn may be associated with very severe effects.

The course of a severe burn may be divided as follows:

1 Immediate shock (first 48 hours)

2 Burn shock (first 48 hours)

3 Toxemia (occurring about 3rd day)

4 Septicemia (about 3rd day)

5 Hemodynamic restoration of function

Treatment

Take blood pressure, pulse, hemoglobin, RBC count, hematocrit and plasma protein at start of therapy and at 24, 48, 72, 96, 120, 144, 168, 192, 216, 240, 264, 288, 312, 336, 360, 384, 408, 432, 456, 480, 504, 528, 552, 576, 600, 624, 648, 672, 696, 720, 744, 768, 792, 816, 840, 864, 888, 912, 936, 960, 984, 1008, 1032, 1056, 1080, 1104, 1128, 1152, 1176, 1200, 1224, 1248, 1272, 1296, 1320, 1344, 1368, 1392, 1416, 1440, 1464, 1488, 1512, 1536, 1560, 1584, 1608, 1632, 1656, 1680, 1704, 1728, 1752, 1776, 1800, 1824, 1848, 1872, 1896, 1920, 1944, 1968, 1992, 2016, 2040, 2064, 2088, 2112, 2136, 2160, 2184, 2208, 2232, 2256, 2280, 2304, 2328, 2352, 2376, 2400, 2424, 2448, 2472, 2496, 2520, 2544, 2568, 2592, 2616, 2640, 2664, 2688, 2712, 2736, 2760, 2784, 2808, 2832, 2856, 2880, 2904, 2928, 2952, 2976, 3000, 3024, 3048, 3072, 3096, 3120, 3144, 3168, 3192, 3216, 3240, 3264, 3288, 3312, 3336, 3360, 3384, 3408, 3432, 3456, 3480, 3504, 3528, 3552, 3576, 3600, 3624, 3648, 3672, 3696, 3720, 3744, 3768, 3792, 3816, 3840, 3864, 3888, 3912, 3936, 3960, 3984, 4008, 4032, 4056, 4080, 4104, 4128, 4152, 4176, 4200, 4224, 4248, 4272, 4296, 4320, 4344, 4368, 4392, 4416, 4440, 4464, 4488, 4512, 4536, 4560, 4584, 4608, 4632, 4656, 4680, 4704, 4728, 4752, 4776, 4800, 4824, 4848, 4872, 4896, 4920, 4944, 4968, 4992, 5016, 5040, 5064, 5088, 5112, 5136, 5160, 5184, 5208, 5232, 5256, 5280, 5304, 5328, 5352, 5376, 5400, 5424, 5448, 5472, 5496, 5520, 5544, 5568, 5592, 5616, 5640, 5664, 5688, 5712, 5736, 5760, 5784, 5808, 5832, 5856, 5880, 5904, 5928, 5952, 5976, 6000, 6024, 6048, 6072, 6096, 6120, 6144, 6168, 6192, 6216, 6240, 6264, 6288, 6312, 6336, 6360, 6384, 6408, 6432, 6456, 6480, 6504, 6528, 6552, 6576, 6600, 6624, 6648, 6672, 6696, 6720, 6744, 6768, 6792, 6816, 6840, 6864, 6888, 6912, 6936, 6960, 6984, 7008, 7032, 7056, 7080, 7104, 7128, 7152, 7176, 7200, 7224, 7248, 7272, 7296, 7320, 7344, 7368, 7392, 7416, 7440, 7464, 7488, 7512, 7536, 7560, 7584, 7608, 7632, 7656, 7680, 7704, 7728, 7752, 7776, 7800, 7824, 7848, 7872, 7896, 7920, 7944, 7968, 7992, 8016, 8040, 8064, 8088, 8112, 8136, 8160, 8184, 8208, 8232, 8256, 8280, 8304, 8328, 8352, 8376, 8400, 8424, 8448, 8472, 8496, 8520, 8544, 8568, 8592, 8616, 8640, 8664, 8688, 8712, 8736, 8760, 8784, 8808, 8832, 8856, 8880, 8904, 8928, 8952, 8976, 9000, 9024, 9048, 9072, 9096, 9120, 9144, 9168, 9192, 9216, 9240, 9264, 9288, 9312, 9336, 9360, 9384, 9408, 9432, 9456, 9480, 9504, 9528, 9552, 9576, 9600, 9624, 9648, 9672, 9696, 9720, 9744, 9768, 9792, 9816, 9840, 9864, 9888, 9912, 9936, 9960, 9984, 10000.

less often of lower abdomen or thorax and rarely over the
 tumb. The patient's psychological reaction to his illness plays
 an important contributing role.

Treatment

A Specific Measures

1. Illness requires explanation.
2. Pyridoxine Hydrochloride USP 50-100 mg ($\frac{3}{4}$ -1 $\frac{1}{2}$ g)
 I.V. may be given but has a usually disappointing
 effect.
3. Indativ (see page 39) and nitroglycerin (see page 42) drugs
 may be employed.
4. Diminhydrin USP (Dr. Mann's) 100 mg (1 $\frac{1}{2}$ gr)
 20-60 mg nut. b.f. and r.p. at 1 $\frac{1}{2}$ d-4 $\frac{1}{2}$ hours
 after therapy.

B General Measures

1. Give intravenous fluids. When patient is dehydrated
 symptomatic, subcutaneous or intravenous fluids
 Electrolyte fluid balance. Correct electrolyte deficiencies.
2. Transfuse with whole blood if anemia is present.

IRRADIATION SICKNESS CAUSED BY NUCLEAR RADIATION (ATOMIC BOMBS)

The symptom dose relationship are with dose level. As
 far as is known, there are no permanent effects in mild cases if
 recovery occurs.

Treatment

There is no known specific treatment. General supportive
 measures with complete bed rest and quiet nutrition as far as
 possible when indicated and blood transfusion when hypotension
 occurs are all that can be offered at present.

Prophylaxis

The most immediate danger of an atomic explosion is the thermal
 burn. This can be minimized somewhat by falling to the ground
 or lying flat on the ground of the body or a kneeling behind a
 building wall or in a trench. To the 10 seconds immediately after the
 bomb explosion. The following are measures advocated by the
 Atomic Energy Commission to minimize exposure to radiation.

- A. Clothing will provide a measure of protection from the skin.
 Any contaminated clothing should be disposed of as soon as
 possible and before entering a non-contaminated area.

B. Clean All Exposed Skin

1. Vigorously rubbing with soap and water is probably syn-
 thetic detergent spraying particulate matter into the air
 and skin fold and areas about body orifices will contribute
 to the spread of contamination. Do not abrade skin and
 do not use contaminated water.
2. If soap and water are not effective isotonic saline (pH 7.0)
 or a mixture of 1% sodium sulfide and starch will be useful.
 Sodium bicarbonate solution is also recommended especially
 for mucous membranes.
3. In an emergency wipe skin with any non-contaminated paper
 or sand or wet grass leaves etc.

may be momentary or prolonged. With recovery there may be muscular pain, fatigue, headache, and nervous irritability. The physical signs vary according to the action of the current. With ventricular fibrillation no heart sounds or pulse can be found and patient is unconscious. The respirations continue for a few minutes becoming exaggerated as asphyxia occurs and then ceasing as death intervenes. With respiratory failure respirations are absent and the patient is unconscious; the pulse can be felt but there is a marked fall in blood pressure and the skin is cold and cyanotic.

Treatment

A. Emergency Measures

1. Free from current at once. This may be done in many ways but rescuer must protect himself in the process. Turn off power. sever the wire with a dry wooden handled axe, make proper ground to divert current, or drag victim carefully away by means of dry clothing or leather belt.
2. Artificial respiration must be started immediately (see page 150) if victim has slow or absent breathing and continued until spontaneous breathing returns or rigor mortis sets in.
3. Precordial compression for ventricular fibrillation or arrest. Artificial respiration will not restore normal heart beat and other measures may not either. If possible in case of the heart and manual pumping of the heart may be employed as a last resort. Electric defibrillators may be employed if by chance available.
4. Treat shock promptly (see page 26).
5. Positive pressure oxygen with carbon dioxide may be used when available or oxygen and carbon dioxide by mask combined with artificial respiration.

B. Hospital Measures

1. Hospitalize patient when revived and observe for sudden cardiac dilatation or secondary hemorrhage.
2. Lumbar puncture if signs of increased pressure are noted.
3. Treat conservatively. The direction and extent of tissue injury may not be apparent for weeks. Infection is usually not a problem early. Patience and delay are important in treatment, allowing an infection to be well established before attempting any surgery. Hemorrhage may occur later and may be severe.

IRRADIATION SICKNESS

Irradiation sickness is the term applied to the syndrome developing during or after the course of therapeutic x-ray administration or after exposure to ionizing radiation (e.g., x-rays, neutrons, gamma rays, alpha or beta particles).

IRRADIATION SICKNESS ASSOCIATED WITH IRRADIATION THERAPY

Among the symptoms are vomiting, weakness, and lassitude and in some cases prostration may occur singly or in combination and may be of varying severity. The symptom complex is most likely to occur when x-ray therapy is given in a short period.

Collect and save washings in clean containers for toxicological examination when indicated. Infringe cases seal with sealing wax and place in a locked refrigerator deliver to toxicologist personally a designated receipt. If refrigerator not available preserve the specimens with equal quantity of 25% alcohol do not use formalin as this interferes with toxicologic examination.

- 4 Gastric fluids (1) Warm tap water or 1% saline
- (2) Thin starch paste of bl (3) Sodium bicarbonate 1%
- (4) Potassium permanganate 1:2000 (1 Gm in 2000 wat) (5) Sodium thiosulfate 1% (6) Hydrogen peroxide 1 or 2%

C Catharsis May be effective in retarding absorption.

Intestinal (Irritation) of Poison or to Intestinal Absorption.
Experiments of the gastric and alkaline always follow with gastric lavage.

A Nutritional Acid and Alkali See specific poisons.

B Precipitation of Chemical See specific poisons.

C Induced by Dermal Dermal contact irritates metals and helps diminish absorption of many poisons. These bland agents also soothe the inflammation of membranes. Use 3 or 4 raw egg whites in 500 cc milk or water. Kimmad milk than flour at resolution (hold if possible).

Symptoms of the Diseases

The victim of a stupor may be kept under close clinical observation in order to help the immediate and delayed complications of the poisoning. Such a patient may develop cerebral edema and should be placed under the care of a psychiatrist.

A Culinary Failure

1 Shock (p. 27) The principal mechanism includes recombination of the water with administration of the lungs and peritoneal fluid to an effective blood volume.

2 Cardiac failure (p. 181) The principal mechanism is in the oxygen debt of the myocardium and the electrolyte imbalance.

3 Pulmonary edema The principal mechanism is in the oxygen debt of the pulmonary capillary bed (p. 147) of the pulmonary circulation. Failure of the venous pressure to be maintained at a normal level.

B Respiratory Abnormalities

1 Respiratory irritation Coughing, pharyngeal irritation, irritation of the larynx and trachea.

2 Respiratory depression Place in opiate. Administer a full dose of paralytic. Resuscitate by other means of respiration until the patient is employed. See also the Stimulation (analgesic drug) of the central nervous system with CNS depressant drug. A warm blanket off orally or rectally. A warm stroking orally.

Aromatic plant of ammonia 2.4 (1/2 l d) in 1 cc per 1 ft.

d Ephedrine 50-120 mg (3/4 2 g) orally or but Nk the midline (C mi) 0.25 1.25 Gm (3 3/4 18 3/4 gr) IV.

DISEASES DUE TO TOXINS

PRINCIPLES OF TREATMENT OF ACUTE POISONING

In the emergency treatment of a *systemic poisoning* in which the toxin has been taken by mouth the following general procedures should be carried out: (1) Remove poison by emesis *or* gastric catharsis *or* diuresis as soon as possible. (2) *or* activate poison with specific *or* general antidote. Follow with lavage. (3) Combat shock *or* collapse and specific manifestations as they arise. (4) Protect mucous membranes with demulcents.

Removal of Poison

Do not use stomach tubes or emetics in poisonings due to strong acids or alkalis or other corrosive agents they may cause gastric perforation.

A. Emesis. This is the quickest way to evacuate gastric contents.

1. Indications. For removal of excess poison in cooperative patients *or* for convenience when a stomach tube is unavailable *or* patient is unable to take stomach tube.
2. Contraindications. (1) Drowsy *or* unconscious patient (danger of aspiration of stomach contents). (2) Ingestion of corrosive poisons *or* kerosene *or* convulsants.
3. Technique. Introduce finger feather *or* other object into throat *or* give one of the following and follow with copious quantities of warm water. (Emesis should be continued until gastric contents are clear.)

Apomorphine hydrochloride 6 mg ($\frac{1}{10}$ gr) *or* *or* will stimulate the patient and will usually induce vomiting.

- b. Powdered mustard 1 tsp in a glass of lukewarm water is an unpleasant and unpleasant emetic but is often available and has the advantage of being generally available.
- c. Sodium chloride 1 Tbsp in a glass of lukewarm water is not very effective but is readily available.

or *or* 250-500 cc

B. Gastric Aspiration and Lavage

1. Indications. (1) Removal of excess of noncorrosive poisons which may later be absorbed from the gastrointestinal tract. (2) Removal of CNS depressant poisons when vomiting does not occur (omitting cathartics). (3) For collection on a deamination of gastric contents for identification of poisons. (4) For convenient administration of antidote.
2. Contraindications. (1) Extensive corrosion of tissues by poison. (2) Staggering delirious *or* stuporous *or* comatose patients because of danger of aspiration pneumonia.
3. Technique. Gently insert a lubricated soft rubber oil-soluble stomach tube through the nostril into the stomach. Lavage *or* *or* but do not distend the stomach. Under normal conditions it is better to lavage with a small quantity of fluid at frequent intervals. Always remove excess of lavage solution.

sw allowed a n rosl e poison (symptom sev e pain burn
ing s sation i mo tha d throat vom tng) CALL PHY
SICIAN IMMEDIATELY Acid d acid like co roslv in
lude sodium a H sulfate (toilet bowl cl a ers) acetic acid
(gla al) sulfu i acid nit ic acid oxalic cid hydrofl o ic
a id (rust r mo s) iodi e a d s l e r n t are (stypic p n
cil) Alk H rro l m includ od m hyd oxide ly (drain
cl s) sod um carbonate (w hing oda) mmonia wate
nd m um hypochlo lte household ble h)

If the plant can wallow all day at night, corrosive poison the following (and amount) may be given:

For the Milk water o milk of magnesia (1 Tbsp / 1 c pwal)

b F r a k l i s M i l k w a t e r y f r u i t , c e o i e g r

For p tie t 1 5 ye old give 1 to 2 p fo p tie t

3 y a d olde p to l q rt

2 I d e vom ting when on cor o ve sub i ces have b en
swall w d G v milk o w r (fo patie t i s y s old
l to 2 c p fo p t ent ver 5 ye rs up to i q art) I d c
v m ting by pla g i ng or the bl n t e d of a poon t
th # ck of th pat ent throa t or by the u f a m tic
(2 Tbsp s i t i a g l s of warm wat r) Whe tching d
vomit g begun place p i t i f a d w n with h ad low than
h ps This pre e t vom tu from t r ngth l g d
e i g f ther dam g

B Inhat d Pola ns C rry pat ant (d not l t him walk) t f ash

al mmedi tly Open all doo and windows Loosen all
tight lothing Apply a tif lal r p r tion if b thing b
stopped or is ir egal r P v t chilli g(wrap pat nt in
blank ts) Keep p ti nt as qu t as pos ible If p ti nt is con
vulsing k p him in bed in a semi d rk room avoid jar ling o
n i e D not giv alcoh l in any fo sm

C Sk ☐ t min t ☐ D ch skin with wat r (how r hos
f t) Apply t e m f wate on skin while remo ing cloth
ig Clean e skin th ro ghly with wat p dity w hing is
m t important in r ducing xt nt of i) ry

D Eye Co t m ti H l d y l d p e n w h e y w i t h g t l
t a m o f n n g w t e i m m e d i a t e l y D l a y o f a f w c o n d
l l y c m t n t o f n y y C o t w s h i n g t i l p h y
s i c i a a D o n o t u s e c h m i a l s t h e y m y i a s
e x t e i o f n j u r y

Life t d Pol n (5 o pion and ake bit) Mak patient lie
dow as soon possibl Do ot giv alc hol in any f m
Apply tourniq t bow inj ti n sit (l i twe th bit
and th h a t) Th pol in v is b low th tou niqu t sh id
ot di appe should th to rafiqu t prod c a throbbing
ns ti n T urniq t should be loos ned f m 1 minut e y
15 minut s Apply ice pa k to the st of th bit Carry p
t nt to physician o ho p t l Do n t let Afm walk

F Ch mi al B rn W sh with l g quantities of rumi g water
(pt in th c f b ns sued by pho ph) Cover
imm di t ly with loo ly ppli d l an loth Avoid u e of
ointment gr ss s powde s and oth r dr gs in f aid treat
ment of b rn T t h ck by k eping pati nt fl t k ping
him w m nd a ring him until arri al of phs an

f Amphetamine sulfate 5 40 mg ($\frac{1}{12}$ $\frac{2}{3}$ gr) orally or I V
 g Methamphetamine hydrochloride 2 5 mg ($\frac{1}{24}$ $\frac{1}{4}$ gr) orally or I V [For use of pentylenetetrazol (Metrazol®) and picrotoxin see page 537]

3 Hypostatic pneumonia (see page 122) . The principal measures include antibiotics and intratracheal aspiration p r n

C Central Nervous System Involvement

1 CNS excitement Use hypnotic or anticonvulsant drugs (see also pages 354 355) e g

a Amobarbital Sodium (Amytal®) 250 500 mg ($3\frac{3}{4}$ $7\frac{1}{2}$ g) as 10% solution I M or I V

b Paraldehyd (1) Oral 5 15 cc (1 4 dr) in cracked ice with milk juice or whisky (2) Rectal 5 30 cc (1 8 dr) in equal quantity of vegetable or mineral oil (3) I M 5 10 cc i to buttock

c Calcium gluconate 10% 10 20 cc ($2\frac{1}{2}$ 3 dr) I V

2 CNS depression Use stimulant drugs (see above)

D Dehydration Use oral or parenteral fluids as tolerated and indicated (see page 18)

E P I See analgesic and narcotic drugs on pages 32 and 33

A M.A. RECOMMENDATIONS ON FIRST AID MEASURES FOR POISONING*

[Since prevention and helpful first aid measures are of great importance the following is provided for the physician's use in public education]

The aim of first aid measures is to help prevent absorption of the poison. SPEED is essential. First aid measures must be started at once. If possible one person should begin treatment while another calls a physician. When this is not possible the nature of the poison will determine whether to call a physician first or begin first aid measures and then notify a physician. Save the poison container and material itself if any remains. If the poison is not known save a sample of the vomitus.

Measures To Be Taken Before Arrival of Physician

A Swallowd Poisons Many products sold in and around the home although not labeled poison may be dangerous if taken internally. For example some medications which are beneficial when used correctly may endanger life if administered properly or in excessive amounts.

In all cases except those indicated below REMOVE POISON FROM PATIENT'S STOMACH IMMEDIATELY by inducing vomiting. This is the essence of the treatment and is often a life saving procedure. Prevent chilling by wrapping patient in blankets if necessary. Do not give alcohol in any form.

1 DO NOT induce vomiting if patient is in comatose unconscious or having convulsions if he has swallowed petroleum products (i.e. kerosene gasoline lighter fluid) or if he has

*Recommendation of the Committee on Toxicology American Medical Association. Bernard E. Conley Ph.D. Secretary. Modified and reproduced with permission from A.S.T.

ALCOHOL METHYL (code No 010 331)

Methyl alcohol is a common combustible instant and CNS depressant which has an affinity for the optic nerve. It is slowly excreted from the body and is metabolized giving formaldehyde and formaldehyde as a product which produces as follows. The MLD by ingestion is 30-60 cc (1-2 oz). The patient experiences headache, epigastric pain, dyspnea, and vomiting and may suffer from suffocation. Examination reveals hyperemic conjunctivae, excremental depression, delirium, coma, and convulsions.

Treatment

1. Give stomach wash with 1 or 2% sodium bicarbonate.
2. Check serum CO_2 .
3. Combat acidosis. Give sufficient sodium bicarbonate orally or alkalinize by maintaining alkali in urine or serum CO_2 content of over 20 mEq/L.
4. Keep patient in shaded room. Give supportive measures as required.
5. Administer Ethyl alcohol 100 proof 30% 3-30 cc very 2-4 hour for 3-5 days.

ALKALIS (code No 010 32)

The strong alkalis are common ingredients of household cleaning compounds and are extremely irritating to the skin. They irritate the effect of the known dermal membrane but in instances of severe lacerations, they are usually fatal and often fatal. The MLD for the solid powder (NaOH and KOH) is 15 Gm (1/2 oz) of strong mineral water 4 (1 oz). Recovery may follow much longer doses however. The symptoms of burning pain, the appearance of the skin is that of a burn and vomiting and difficulty in swallowing and burning. Physiological examination reveals increased oral and edema of the skin, mucous membranes in the mouth, bloody vomit and stool, dyspnea, and dilatation of the pupils.

Treatment (Aid must be given as if possible a possibility)

1. Dilute in gastric juice; neutralize alkali 120 to 240 (4-8 oz) of 5% hydrochloric acid may be used.
2. Give fluid orally (helps excretion by formation of a precipitate) which is excreted with water. 1-2 Tbsp given 500 cc (1 pint) of water.
3. Withhold food until the patient feels better.
4. Supportive measures as necessary.
5. Withhold oral fluids with dilution of the gastric juice.
6. Wash eyes with water.

ARSENIC

(Aide code No 010-3114) (Chemical code No 011 3114)

Arsenic is found in industrial chemicals, pesticides, and arsenical compounds.

A variety of the following may occur: nausea and vomiting, abdominal pain, diarrhea, a marked thirst, burning sensation and difficulty in swallowing. The patient may have a metallic taste in the mouth.

Measures to Prevent Poisoning & Accidents

- (1) Keep all drugs, poisons & substances and household chemicals out of the reach of children
- (2) Do not store noxious products on food shelves
- (3) Keep all poisonous substances in their original containers & do not transfer to unlabeled containers
- (4) When medicines are discarded discard them. Do not throw them where they might be reached by children or pets
- (5) When giving flavored or brightly colored medicine to children always refer to the medicine as "sugar candy"
- (6) Do not take or give medicine in the dark
- (7) READ LABELS before using chemical product

TREATMENT OF SPECIFIC POISONINGS (ALPHABETICAL ORDER)

ACIDS CORROSIVE (code No. 010 ■)

The strong mineral acids exert primarily local corrosive effect on the skin or mucous membranes. In severe burns result to yolk pus may result. The M.L.D. is 4 cc (1 dr.) of concentrated acid. Symptoms include severe pain in throat and upper gastrointestinal tract. It is marked thirst, bloody vomit, difficulty in swallowing, breathing and peking discoloration and destruction of skin and mucous membranes in a day or two. Mouth collapse and shock.

Treatment: (Avoid emetic or lavage if possible. It is a possibility)

- 1 Dilute as immediately with copious amounts of water, milk or egg whites. Do not waste time looking for specific chemical antidotes.
- 2 Limestone, magnesia or aluminum hydroxide to neutralize acid. Avoid carbonates. A barium carbonate is not suitable since it forms and attention of already weakened stomach will.
- 3 Egg white beaten with 500 cc milk or water as a demulcent.
- 4 External burns: Wash with weak sodium bicarbonate solution.
- 5 Eye: Wash well with 1% sodium bicarbonate solution.
- 6 Get also positive cases. (code N 031)

ALCOHOL ETHYL

Ethyl alcohol is a mucous membrane irritant and a CNS depressant. The M.L.D. is 100-200 (370) fpu. It is lethal when ingested at once.

Treatment: (Avoids death so far as possible)

A. Antidote to ethanol (code N 010 33)

- 1 Call for examination specifically for ethanol.
- 2 Large amount of water, 1/2 cup, containing 4 Gm (1/10 tsp) of sodium bicarbonate or give 500 mg (1/10 gr) if alcohol has recently been ingested.
- 3 Stimulant: Strong black coffee, allyl or ethyl alcohol, n-ketamide injection (Coramene®) 25% 1.5 ml V.
- 4 Resuscitation for comatose patient if dead immediately after use of antidotes. Allyl or ethyl alcohol.

B. Dose of Tremor (code N 003 33)

- 2 Gastric lavage with 1:2000 potassium permanganate. Be certain to remove all permanganate in final aspiration. This is of doubtful value if performed more than 6 hours after ingestion and may be dangerous. CAUTION: Danger of aspiration pneumonia is great in stuporous or comatose patients. Flushing is of no value.
- 3 Indwelling catheter. Save all urine for toxicologic studies.
- 5 Antibiotic drug. Penicillin 300,000 to 500,000 units I.M. daily to less danger of pneumonia.
- 6 Parenteral fluid. If renal failure is absent and renal function is adequate give 1 L. physiological saline and 1/2 L. 5% dextrose I.V. in water daily to maintain urine output (1 1/2 L./24 hours). Unless fluid loss has been excessive don't give more than 2 1/2 L. of fluid during the first 24 hours in event of circulatory collapse use plasma.
- 7 Central nervous system stimulants (analgesics or convulsants drug). These are entirely obsolete but are utilized to maintain patient's reflexes and reflexes. Their place in therapy is uncertain. They do not hasten the duration of effect of the drug and further they are the dose may be even more severe. They are often dangerous drugs and unless used carefully may jeopardize the patient's chance for recovery. Specific therapy of the various analgesic agents is of therapeutic value. See also analgesic. CAUTION: Analgesics should not be considered to substitute for direct physiologic treatment of depressed respiration and circulatory inhibition.
 - a Picrotoxin Injection U.S.P. (0.3% or 3 mg/cc.) Administer 2-3 I.V. (or I.M.) at once and follow with 3 cc. every 20-30 minutes until return of reflexes. Small twitching of body movements (not convulsions). Give maintenance dose as necessary to keep patient at this level.
 - b Pentylenetetrazol Injection U.S.P. (Meftraol®) (10% or 100 mg/cc.) (After M. physical.) Give 3-5 cc I.V. at 15-30 min I.V. in 15 minutes if patient is arflexic. If I.V. every 30 minutes until return and 2-5 I.M. per hour until full consciousness is attained. Other preparations: Amphetamine, ephedrine, methamphetamine and strychnine have been used successfully alone or in combination but their superiority over the above is time consuming. Both benzydol and the tharamide (Megidol®) (N,N-methyl thylglutimide) has been enthusiastically reported as a effective new substitute for a tagist in the treatment of a tubular constriction. Epeine in the country's egg states that the drug poses a specific analgesic properties but this is little evidence of true benzydol to tago ism.
- 8 The artificial kidney or peritoneal dialysis is indicated in severe cases when available.

BELLADONNA DERIVATIVES

(Atropine code No 010 382) (Scopolamine code No 010-379)

The belladonna alkaloids are parasympathetic depressants with variable CNS effect. The M.L.D. is 2.8 mg (1/30-1/10 gr.) of atropine. The usual lethal dose is a range 100 mg (1 1/2 gr.)

Treatment

- 1 Emetic or abundant gastric lavage with warm water
- 2 Follow with demulcent drink
- 3 Symptomatic relief of diarrhea (e.g. codeine)
- 4 Dimercaprol Injection U.S.P. (BAL®) 10% solution in oil
Give 1 M (Eagle J Ven Dis Inform 27:114 1946)
 - a Severe poisoning 3 mg /Kg / dose (1.8 cc /80 Kg)
 - 1st day 1 inject on eve y 4 hours day and night
 - 2nd day 1 injection every 4 hours day and night
 - 3rd day 1 injection every 6 hours for 4 doses
 - 4th day on 1 injection b 1 d for 10 days or until recovery is complete
 - b Mild poisoning 2.5 mg /Kg /dose (1.5 cc /80 Kg)
 - 1st day 1 injection every 4 hours for 4 doses
 - 2nd day 1 injection every 4 hours for 4 doses
 - 3rd day 1 injection b 1 d
 - 4th day on 1 injection once or twice a day for 10 days or until recovery is complete
 - c Toxic reactions to BAL® These appear to be transient and over in 30 minutes. They include nausea vomiting headache generalized aches and pains and burning sensation about the head and face. Barbiturates have been recommended for severe side effects.

BARBITURATES (code No. 010 3371)

Barbiturate are used for date hypnotic or anticonvulsant purposes. The barbiturates are one of the most common means of both suicidal and accidental poisoning.

Obtain data on dosage and time of ingestion from patient relatives, friends or attending physician when possible.

A Mild Symptoms Drowsiness mental confusion headache there may be euphoria or irritability.

B Moderate or Marked Symptom Delirium stupor shallow and slow respirations circulatory collapse cold clammy skin cyanosis pulmonary edema dilated and non reacting pupils hyporeflexia areflexia coma and finally death.

Treatment

- A Mild Symptoms** Symptomatic and supportive nursing care. Stimulants should be limited to caffeine. Keep patient under observation until danger has passed. Place suicidal patients under psychiatric care.
- B Moderate or Marked Symptoms** Most of the patients will survive even days of unconsciousness if the airway is kept open (usually requires tracheotomy) and if artificial respiration is maintained (usually with a tank respirator). The patient should be hospitalized and until shock has been initiated (see page 27). Record the following at 15- to 30 minute intervals until the danger has passed: temperature pulse respiration and BP mental status or state of consciousness skin color (cyanosis or pallor) lung bases (pulmonary edema) reflexes (corneal pupillary gag patellar) and sensation (response to pain).
 - 1 Airway Aspirate mucus pull tongue forward and insert oropharyngeal airway. Insert tracheal or tracheostomy intubation may be advisable.

CARBON TETRACHLORIDE (code No 010 33411)

This agent is a very common solvent and a strong agent in industry and the home. It is a local irritant, cardiac depressant and a general CNS depressant and a general protoplasmic poison which has a marked effect on the liver and kidneys. It enters the body by ingestion and inhalation. The M.L.D. is 4 cc (i.d.) when ingested, the M.L.D. by inhalation is unknown. The symptoms include headache, dizziness, nausea, vomiting, diarrhea, abdominal pain, weakness, general disturbances, nervousness and intoxication. Finally, a central liver jaundice, oliguria and uric acid later appears as a diarrheal stool.

TreatmentA. Active Poisoning

1. Remove from exposure, keep warm and warm.
2. Lavage copiously with 1:2000 potassium permanganate.
3. Sodium bicarbonate 30 Gm (1 x) i.v. at once.
4. Treat as potent liver hepatitis (see page 279). Observe for oliguria. If it becomes life threatening, start intravenous fluids (see page 303).
5. Initiate supportive therapy.

B. Chronic Poisoning (Avoid Alcohol)

1. Remove from exposure.
2. Carefully evaluate heart, liver and kidney function.
3. Treat as potent liver (see page 281).
4. Symptomatic and supportive measures.

CYANIDES (code No 010 353)

Hydrocyanic acid and the cyanides are death by inactivation of the primary symptom is tingling, tingle of oxygen by the tissues. The M.L.D. is 2 (i.d.) by ingestion or inhalation. The lethal dose of gaseous cyanide is from 100 to 200 mg and is a compound of cyanide, cyanide and profound hypoxia. The odor is bitter almond in the blood.

Treatment: Work as rapidly for death occurs quickly

- A. If Inhalation (1) Place in open air, keep warm, stop motion (2) Maintain artificial respiration (the manally until a relief is obtained) (3) Amyl nitrite (place pea in the mouth) by inhalation for 15-30 seconds every 2-5 minutes (4) Sodium nitrite 10-15 cc of 3% solution or 50 cc of 1% solution i.v. at 2-4 minutes (5) Injection (6) Follow sodium nitrite with 50 cc of 25% solution of sodium thiosulfate if tolerated i.v. (6) Repeat N 4 and N 5 if symptoms recur.
- B. If Ingestion Give amyl nitrite as above. Lavage stomach copiously with 3% hydrogen peroxide or 10% sodium thiosulfate solution. 1:2000 potassium permanganate solution.
- C. Supportive therapy

CHLOROPHENOTHALE (DDT) (code No 010 3)

DDT is a CNS stimulant which causes poisoning by ingestion, inhalation or dermal contact. The M.L.D. is probably about 20 cc (i.d.) but if fatalities have been reported. When

The patient complains of dryness of mouth thirst difficulty in swallowing and blurring of vision. The physical signs include dilated pupils fixed skin tachycardia fever delirium delusions paralysis and stupor.

Treatment (Avoid opiates)

1. Tincture of iodine 4 cc (1 dr) in 1000 cc (1 qt) of water
2. Universal Antidote charcoal in water (See back cover)
3. Lavage well with 1:2000 potassium permanganate solution
4. Sodium sulfate 30 Gm (1 oz) in water
5. Pentobarbital sodium 0.1 Gm (1 1/2 gr) for excitement
6. Institute supportive measures

BROMIDES

(Acute code No 010 3217) (Chronic code No 011 3217)

Bromides are CNS depressants frequently found in medicinal preparations. Acute poisoning is rare. The symptoms include somnolence constipation drowsiness apathy and hallucination. The physical examination reveals decreased conjunctival reflexes, slow tongue, unequal and irregular pupils, ataxic abnormal reflexes (often bilateral), toxic psychosis, delirium and coma.

Treatment

1. In acute poisoning lavage copiously with saline to remove unabsorbed bromides and later to remove those absorbed into the stomach. Follow with magnesium sulfate 30 Gm (1 oz) as a cathartic.
2. Sodium chloride 6-12 Gm (90-180 gr) daily in addition to regular dietary intake 1000 cc saline IV bid or the same orally 0.1-2 Gm (1.5-30 g) every 4 hours orally. Treat until blood bromide level is below 50 mg/100 cc.
3. Force fluids to 4000 cc daily.
4. Continue warm baths (95-98 F) or sedative cold packs as necessary.

CARBON MONOXIDE (code No 010 352)

This gas is responsible for many deaths and numerous deaths result from the use of unvented gas or oil burning stoves. It is also used for suicidal purposes. It combines with hemoglobin to form a relatively stable compound which conditionally causes tissue anoxia. Manifestations are headache, lightheadedness, giddiness, tingling, vomiting, cherry red skin, vertigo, loss of memory, fainting, collapse, paralysis and unconsciousness.

Laboratory Data When boiled or when shaken with 1 to 2 volumes of sodium hydroxide blood remains red while normal blood becomes black or brown black.

Treatment

1. Remove patient to fresh air keep warm, loose clothing and maintain rest.
2. Artificial respiration or resuscitation 100% oxygen per
3. Give 50 cc of 50% glucose IV for cerebral edema.
4. Institute supportive measures.

Treatment

- 1 Starch flour raw egg white o 1% sod thio ulf is in w ter
- 2 Follow with metic or remov by lav ge with 1% sodium thiosulfate sol tion Repeat until evide of iodine has dis appea ed f om gastric contents
- 3 Then giv demulcents e g milk o bari y w ter
- 4 Symptomatic and supportive meas e for systemic reacti n e g stimulants o anticonvulsants

LEAD (code No 010 3112)

Lead may poison by ingestion or inhalation of its dust or fumes. It has local stringy action and a general toxic effect. The M.L.D. is 10 Gm (150 g) of lead acetate. Poisoning is manifested by metallic taste, dry throat, thirst, abdominal colic, vomiting diarrhea, constipation, headache, leg cramps, black stools (lead sulfide), oliguria, stupor, convulsions, pallor, and coma. In the chronic form the variable element of the C.N.S. blood forming organs and gastrointestinal tract.

I agree that

A Ac le Poison! & Do not use BAL®

1. Lavage with dilute magnesium sulfate or sodium lactate solution preoperatively in adult lead ulcers.
2. Treat symptomatically. Avoid nasogastric treatment with loperamide at a therapeutic dose and sedatives.
3. Edathamil Calcium Diethylenetriaminepentaacetate (EDTA Verso test) forms a colorless and biologically complex that is excreted in the urine and does not need special handling in the urine. It is administered orally in 5% solution (2% solution) or intravenously in 10% solution (containing 0.5% potassium) in a total dosage of 50-75 mg/kg body weight per 24 hours for a course of 5-7 days. The drug is nephrotoxic and should not be given to patients with renal impairment. In 24 hours, the renal function and creatinine levels of the patient containing 1 liter of urine may be determined. In the case of acute renal failure, the patient should be treated with a diuretic. In the case of nephropathy especially in children, renal function and fluid and electrolyte equilibrium must be monitored on an individual basis.

B Ch onj Poison R

- 1 R m man tly from xp
2 Adeq at ch tw th it min pplements
3 Co s s of EDTA m y be employ d especially wh n h ma
4 I phyl tic EDTA h uld n be eda s s batit te fr
 ed pr e tive and p tecti me s s (xpo u e)

MERCURY (code No. 010-3111)

M r u y p o i s i n g o c r s b y i n g t i o n o r i n h a l a t i n . I t i s a g M i p r t p l a s m i p o i s . T h e M L D i s a b o u t 70 m g (1 + g r) o f m r y b i h i d e . T h e m a n i f e s t a t i o n i n l d m t a l l i c t a s t l i v a t i o n t h i r s t b u r n i n g s e n s a t i o n i n t h r o a t d i c c o n s t a n t a n d m o f o r a l t i s e s b d o m i n a l p a i n v o m i t i g b l o o d y d i a r h e a n d s h o c k i n t h e h o u s e f m t h e r e i s w e a k n e s s a t a x i i n t e n t i o n t r e m o r r i r r i t a b i l i t y d e p r e s s i o n a n d m c l c r a m p s .

poisoning occurs from the material in solution the actual poisoning is usually due to the organic solvent and not DDT. The manifestations are tired and aching limbs, nervous irritability, mental sluggishness, muscle twitchings, convulsions, and coma.

Treatment (Avoid epinephrine may cause ventricular fibrillation)

- 1 Universal antidote at once if available (see back cover)
- 2 Lavage with large quantities of warm water
- 3 Sodium sulfate 30 Gm (1 oz) in water
- 4 Pentobarbital sodium 0.1 Gm ($1\frac{1}{2}$ gr) orally Give 0.25 to 0.5 Gm Amobarbital Sodium N.F. (Amytal®) as fresh 10% solution slowly I.V. or I.M. for convulsions
- 5 Calcium gluconate 10% 10 cc I.V. for convulsions
- 6 Supportive measures as necessary
- 7 High CHO high protein diet with added vit. B to protect liver

FLUORIDE POISONING (code No. 010 3215)

Fluorides are found in agricultural poisons and insect powders and are used in the aluminum industry. Clinical features include nausea, vomiting, colicky abdominal pain, diarrhea, cyanosis, C.N.S. excitement, and convulsions.

Treatment

- 1 Lime water or other soluble calcium salts orally in large quantities
- 2 Give emetic or use copious gastric lavage with lime water
- 3 Egg whites beaten with 500 cc (1 pt) milk or water
- 4 Stimulants (see page 531)
- 5 Calcium gluconate 10% 10 cc I.V. repeat if tetany occurs
- 6 Give artificial respiration and combat shock

GASOLINE AND RELATED COMPOUNDS (code No. 010 33x)

Gasoline poisoning may result from inhalation or ingestion, but more severe symptoms result from inhalation because the C.N.S. is more quickly reached by this route. Acute manifestations are vomiting, vertigo, muscular incoordination, weak and irregular pulse, twitchings, and convulsions. In the chronic form there is also headache, drowsiness, dim vision, cold and numb hands, weakness, loss of memory, loss of weight, tachycardia, mental dullness or confusion, so-called methemoglobinemia, and secondary anemia.

Treatment

- 1 Remove to fresh air
- 2 Lavage with kerosene oil and/or large amounts of warm saline
- 3 Sodium sulfate 30 Gm (1 oz) in water followed by mineral oil 120 cc (4 oz)
- 4 Watch closely for 3-4 days for severe symptoms or collapse

IODINE (code No. 010 3218)

Clinical features include characteristic stain of mouth and odor of breath, yellow or bluish vomitus, pain and burning in pharynx and esophagus, marked thirst, diarrhea (stools may be bloody), weakness, dizziness, syncope, or convulsions.

Mushroom Poisoning

	Amanita muscaria (fly agaric)	Amanita phalloides (death cap)
Pharmacology	Psychotropic stimulant by alkaloid muscarine	Drugs to which most all effects are peculiarly due
Onset of symptoms	Onset 1-2 hours Central excitation thirst, nausea and vomiting diarrhea, wheezing salivatory salivary tremor, weakness collapse and death	Delayed 12-24 hours Central depression hiccups, convulsions coma, vomiting bloody vomit and stool profuse lacrimation profuse diaphoresis
Route of treatment	1 Removal of GI contents by emesis and lavage followed by catharsis 2 Correction of metabolic alkalosis by administration of potassium chloride 1-2 mg (1/60-1/30 gr) subcutaneous drip 30 min per hour 3 Sedation with barbiturates if necessary 4 Frequent fluids by oral and parenteral route 5 Tetrahydrocannabinol	1 Removal of GI contents by emesis and lavage followed by catharsis 2 Antidote: Trichloroethylene as a symptom reliever at a dose of 1-2 mg (1/60-1/30 gr) by subcutaneous drip 30 min per hour 3 Relief of pain with analgesics 4 Protocols with 5% dextrose in water 24 hours if necessary 5 Tetrahydrocannabinol

OXALIC ACID (Continued from previous page)

Treatment

- 1 Give 1 ml tasteless 0.1% solution (1 oz) in water, 1/2 glass of milk, or 1/2 glass of milk to patients unable to swallow.
- 2 Give 1-2000 pot. permanganate solution.
- 3 White of eggs beat with milk and demulcent.
- 4 Chlorine tablets 10 c of 10% solution 1 vial and 1 ml of 1.2 Gm (15-30 gr) or 1/2 qd.
- 5 Instill 5 pp. tv. m. s. es.

PESTICIDES

Common Pesticides and Their Treatment

Amit

- 1 Amit 1 [Calcium cyanide, lead acetate, pyrethrin (P. isogen)] Dm. pol. U.S.P. (BAL®) 536]
- 2 Lead salts [Lead acetate] Ed. thami. Calcium D. sodium N.N.D. (V. e. te®) (See p. 541) DO NOT USE BAL®
- 3 Copper salts [Copper sulfate (blue vitriol) used in Bordeaux mixture] Symptomatic and supportive Sodium

Treatment

- 1 Give white of eggs beaten with water or skimmed milk
- 2 Dimercaprol (BAL[®]) at once (see page 538)
- 3 Sodium sulfate 30 Gm (1 oz) in water
- 4 Fluids 1000 cc (1 qt) of saline I V \equiv once (may add 1 Gm sodium thiosulfate) and repeat as necessary
- 5 Watch urinary output. Treat oliguria and anuria if it occurs (see page 303)
- 6 Symptomatic and supportive measures as necessary
- 7 In chronic form remove from exposure. may give 10 Gm (15 gr) of sodium thiosulfate in 10 cc (2 1/2 dr) water I V every other day

MORPHINE (AND THE OPIATES) (code No 010 370)

Morphine acts primarily on the C N S causing depression and narcosis. The M L D is 65 mg (1 gr) in susceptible individuals. Manifestations headache nausea excitement depression pinpoint pupils slow respirations rapid and feeble pulse shock and coma

Treatment

- 1 Nalorphine Hydrochloride U S P (Nallin[®]) a narcotic antagonist in doses of 5-10 mg I V \equiv an antidote for overdosage of morphine and its derivatives meperidine (Demerol[®]) and methadone. If effective in cases in pulmonary ventilation is not relieved with the initial dose 5-10 mg may be repeated every 15 minutes until respirations return to normal and patient responds to stimuli
- 2 Maintain adequate respiration by use of artificial respiration or preferably resuscitators with oxygen
- 3 Keep patient awake and warm. Have him walk if necessary or use ammonia inhalation and strong stimuli
- 4 Lavage stomach well (prevent aspiration) with 1-2000 potassium permanganate at short intervals. Morphine is excreted into the stomach
- 5 Sodium sulfate 30 Gm (1 oz) in water as a cathartic
- 6 Atropine sulfate 0.5 mg (1/120 g) subcut if spirations are poor repeat as necessary

MUSHROOMS (code No 010 384)

The Amanita genus of mushrooms accounts for almost all cases of fungus poisoning in the United States. Amanita muscaria poisoning of rapid onset. The poisons specifically ally to atropine. If treated promptly recovery most often follows. The deadly type of mushroom poisoning due to Amanita phalloides. A. b. unguis and A. verna has no specific antidote and the prognosis is usually poor.

Mushroom poisoning is summarized in the table on page 543

OXALIC ACID (code No 010 3332)

Oxalic acid a component of bleach powder is a powerful local irritant which precipitates insoluble calcium. The M L D is 4 Gm (1 dr). Poisoning is manifested by burning in mouth and throat violent abdominal pains bloody vomit and dyspnea tremor oliguria and circulatory collapse

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Treatment

- 1 Keep patient quiet in a darkened room avoid stimulation
- 2 At once 0.5 Gm (7½ gr) sodium amytal I V slowly in 10-20 cc (2½-5 dr) of water. If not available give drug orally in doses up to 5 times the hypnotic dose. May repeat
- 3 Artificial respiration and oxygen during convulsions
- 4 Lavage gently with 1:2000 potassium permanganate solution before symptoms appear
- 5 Inhalations of ether or chloroform to quiet patient

SNAKE (AND GILA MONSTER) BITES (code No 010 3814)

The venom of poisonous snakes and lizards may be neurotoxic or hemotoxic. Neurotoxic cause respiratory paralysis hemotoxic cause hemolysis and destruction of endothelial lining of blood vessels. The manifestations are local pain, thirst, profuse perspiration, nausea, vomiting, stimulation followed by depression, local redness, swelling, extravasation of blood and collapse.

Treatment (Avoid opiates and alcohol)

- 1 Keep patient recumbent and quiet
- 2 Apply tourniquet (tight enough to block lymphatic flow but no venous return) above bite releasing for 1-2 minutes every 15-20 minutes
- 3 Make deep cross incisions at bite and apply suction
- 4 Give specific antivenom as soon as possible (Follow printed instructions)
- 5 Plenty of warm fluids
- 6 Biturite sedation as needed
- 7 Institute supportive measures
- 8 Hospitalize and determine blood type as soon as possible give transfusion as necessary. Corticosteroids and antibiotics may be helpful during treatment (see pages 423-8)

SPIDER BITES (code No 010 3815) AND**SCORPION STINGS (code No 010 3815)**

(Black Widow Spider Bite code No 010 3816)

The venom of the less venomous species of spiders and scorpions usually local pain, redness and swelling. That of the more venomous species causes general circulatory pain, convulsions, nausea, vomiting, variable CNS involvement and collapse.

Treatment

- 1 Apply tourniquet to restrict circulation and apply suction
- 2 If absorption has occurred give 10% of 10% calcium gluconate I V or I M Repeat as necessary
- 3 Give specific antivenom (None available in U.S.A.)
- 4 Keep patient recumbent and quiet
- 5 Hot baths and 20 cc of 10% magnesium sulfate I V for relief of pain (see section on page 296)
- 6 Admit to hospital in intensive supportive measures
- 7 Hot compresses of sodium bicarbonate solution for relief of local pain if convulsions involuntarily
- 8 Corticotropin (ACTH) or other corticosteroids may be of some value in severe cases (see page 423)

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TABLES OF APPROXIMATE EQUIVALENTS

Weight Equivalents		Volume Equivalents	
Apothecary	Metric	Apothecary	Metric
1/320 gr	0.2 mg	1 min (℥)	0.06 cc
1/210 gr	0.3 mg	3 min (℥)	0.18 cc
1/160 gr	0.4 mg	5 min (℥)	0.3 cc
1/120 gr	0.5 mg	8 min (℥)	0.5 cc
1/100 gr	0.6 mg	10 min (℥)	0.6 cc
1/60 gr	1.0 mg	12 min (℥)	0.75 cc
1/30 gr	2.0 mg	15 min (℥)	0.9 cc
1/15 gr	4.0 mg	16 min (℥)	1.0 cc
1/12 gr	5.4 mg	20 min (℥)	1.2 cc
1/10 gr	6.5 mg	30 min (℥)	1.8 cc
1/8 gr	8.0 mg	50 min (℥)	3.0 cc
1/6 gr	11.0 mg	1 fl dr (℥)	3.7 cc
1/4 gr	16.0 mg	65 min (℥)	4.0 cc
1/3 gr	22.0 mg	80 min (℥)	5.0 cc
3/8 gr	24.0 mg	2 fl dr (℥)	7.5 cc
1/2 gr	32.0 mg	2 2/3 fl dr (℥)	10.0 cc
3/4 gr	8.0 mg	4 fl dr (℥)	15.0 cc
1 gr	65.0 mg	5 1/2 fl dr (℥)	20.0 cc
1 1/2 gr	0.1 Gm	8 fl dr (℥)	1.0 fl oz
2 gr	0.13 Gm	1 fl o (℥)	30.0 cc
3 gr	0.2 Gm	1 2/3 fl oz (℥)	50.0 cc
5 gr	0.32 Gm	2 fl o (℥)	60.0 cc
1/2 gr	0.5 Gm	3 3/8 fl o (℥)	100.0 cc
10 gr	0.85 Gm	4 fl oz (℥)	120.0 cc
15 gr	1.0 Gm	8 fl o (℥)	240.0 cc
1 dr (℥)	4.0 Gm	16 fl o (℥)	480.0 cc
1 oz (℥)	30.0 Gm	1 pt	480.0 cc

Household Measures	Apothecary	Metric
1 tea spoon	1 fl dr (℥)	4 cc
1 table spoon	1/2 fl o (℥)	15 cc
1 teacup	4 fl oz (℥)	120 cc
1 glass (tumbler)	8 fl oz (℥)	240 cc
1 measuring cup	8 fl oz (℥)	240 cc
1 pint	16 fl oz (℥)	480 cc

CENTIGRADE TO FAHRENHEIT TEMPERATURES

C	F	C	F	C	F
35	95	37.5	99.5	40	104
35.5	95.9	38	100.4	40.5	104.9
36	96.8	38.5	101.3	41	105.8
36.5	97.7	39	102.2	42	107.6
37	98.6	39.5	103.1	43	109.4

METRIC SYSTEM

Weight	1,000 micrograms (μ)	1 milligram (mg)
	1,000 milligrams (mg)	1 gram (Gm)
	1,000 grams (Gm)	1 kilogram (Kg)
Volume	1,000 cubic millimeters	1 milliliter (ml)
		or 1 cubic centimeter (cc)
	1,000 cubic centimeters (ℓ)	1 liter (L)

IDEAL WEIGHT FOR ADULTS AGES OF 25 AND OVER

(Country of the Mediterranean Sea and the Caribbean)

Height (Wt Sh)		Ideal Weight in Pounds and Kilograms for MEN (For weight without shoes, clothing, etc.)						
Feet	Inches	5m 11 F m		M d m F m		L g F am		
		Lb	Kg	Lb	Kg	Lb	Kg	
5	2	157 5	114 12	5 8 56 7	124 133	56 3 60 3	131 14	59 4 64 4
5	3	160 0	119 128	54 0 58 1	127 136	57 6 61 7	133 144	60 3 65 3
5	4	162 6	122 132	5 3 59 9	130 140	5 9 63 3	137 149	62 1 67 6
5	5	165 1	1 138	57 1 61 7	134 144	60 8 65 3	141 153	63 9 69 4
5	6	167 6	1 9 133	58 5 63 1	137 147	62 2 68 7	145 157	65 8 71 2
5	7	170 2	133 143	60 3 64 9	141 151	6 6 68 5	149 16	67 6 73 5
5	8	172 7	134 147	61 7 66 7	145 156	65 8 70 8	153 166	68 4 75 3
5	9	175 3	140 151	63 5 68 5	149 160	67 6 72 6	157 170	71 2 77 1
5	10	177 8	144 155	5 3 70 3	153 164	6 4 74 4	161 175	73 0 79 4
5	11	180 3	148 159	67 1 72 1	157 168	71 2 76 2	165 180	74 8 81 7
6	0	18 9	15 184	69 0 74 4	161 173	73 0 78 5	169 185	76 7 83 9
6	1	185 4	157 189	71 3 76 7	166 178	75 3 80 7	174 190	78 9 86 2
6	2	188 0	163 17	73 9 79 4	171 184	77 6 83 5	1 9 18	81 2 88 9
6	3	190 5	168 180	76 2 81 7	176 189	79 8 85 7	184 202	83 5 91 8

Height (Weight Sh.)		Ideal Weight in Pounds and Kilograms for WOMEN (For weight without shoes, clothing, etc.)						
Feet	Inches	5m 11 F m		M d m F m		L g F m		
		Lb	Kg	Lb	Kg	Lb	Kg	
5	0	152 4	103 113	47 6 51 3	112 120	50 8 54 4	119 129	54 0 58 5
5	1	154 9	107 115	48 5 52 2	114 122	51 7 5 3	121 131	54 9 59 4
5	2	157 5	110 118	49 5 53 5	117 125	53 1 56 7	124 135	56 3 61 3
5	3	160 0	113 121	51 3 54 4	1 0 128	54 4 58 1	127 138	57 6 6 8
5	4	16 6	116 12	5 6 56 7	1 4 132	56 3 59 9	131 14	59 4 64 4
5	5	165 1	119 128	54 0 58 1	127 135	57 6 61	133 143	60 3 65 8
5	6	167 6	123 13	55 8 59 9	130 140	58 9 63 5	136 150	62 6 68 0
5	7	170 2	126 136	57 2 61 7	134 144	60 8 65 3	14 154	64 4 69 9
5	8	172 7	129 139	58 5 63 1	137 147	62 2 66 7	145 158	65 8 71 7
5	9	175 3	133 143	60 3 64 9	141 151	64 0 68 5	149 162	67 8 73 5
5	1	177 8	13 147	61 7 66 7	145 155	6 8 70 3	152 166	69 0 75 3
5	11	180 3	139 150	63 1 68 0	148 158	67 1 71 7	155 169	70 3 76 7
6	0	182 9	141 153	64 0 69 4	151 163	68 5 73 9	160 174	72 6 78 9

F g 18 2 pp 5m d l w gh an b l l d by
 clothing 10 lb (4.5 Kg) f by f g l than 25 y s

AVERAGE HEIGHT AND WEIGHT FOR CHILDREN

AVERAGE HEIGHT AND WEIGHT FOR CHILDREN										
Age	BOYS					GIRLS				
	Height		Weight			Height		Weight		
Years	Feet	Inches	Cm	Lb	Kg	Feet	Inches	Cm	Lb	Kg
Birth	1	8	45 7	7 1/2	3 4	1	8	50 8	7 1/2	3 4
1/2	2	2	66 0	17	7 7	2	2	66 0	16	7 2
1	2	5	73 6	21	9 5	2	5	73 6	20	9 1
2	2	8	83 8	26	11 8	2	8	83 8	25	11 3
3	3	0	91 4	31	14 0	3	0	91 4	30	13 6
4	3	3	99 0	34	15 4	3	3	99 0	33	15 0
5	3	6	106 6	39	17 7	3	6	104 1	38	17 2
6	3	9	114 2	46	20 9	3	9	111 7	45	20 4
7	3	11	119 3	5	23 1	3	11	119 3	49	2 2
8	4	2	127 0	57	25 8	4	2	127 0	56	25 4
9	4	4	13 0	63	28 6	4	4	132 0	62	28 1
10	4	6	137 1	89	3 3	4	6	137 1	89	31 3
11	4	8	142 2	77	34 8	4	8	142 2	77	34 9
12	4	10	147 3	83	37 7	4	10	147 3	88	39 0
13	5	0	152 4	92	41 7	5	0	152 4	98	45 5
14	5	2	157 5	107	48 5	5	2	157 5	107	48 5
15	5		62	16	52 6	5	3	160 0	115	52 2
16	5	6	167 6	128	58 0	5	4	162 6	118	53 5
17	5		7	134	6 8	5	4	16 6	118	53 1

W g g 5 d 17 1 em by and bl